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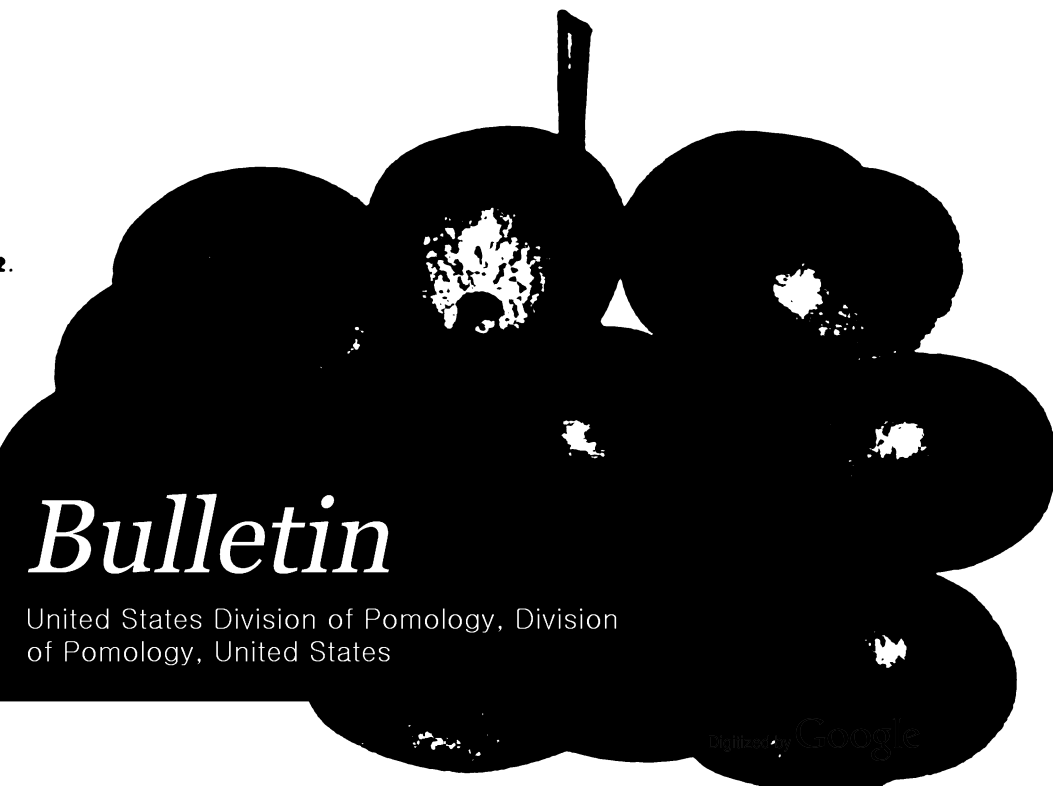
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U. S. DEPARTMENT OF AGRICULTURE. —
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Bulletin No. 1.

REPORT

ON

THE CONDITION OF TROPICAL AND SEMI-TROPICAL FRUITS

IN THE

UNITED STATES

IN

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INTRODUCTORY NOTE.

U. S. DEPARTMENT OF AGRICULTURE,

Washington, D. C., June 11, 1891.

SIR: For some months no copies of Bulletin No. 1, of the Division of Pomology, have been available for distribution, though numerous requests for this report and for information upon the subjects of which it treats, continue to be received in this Division. Permit me to request, therefore, the issue of a second small edition of the bulletin for the use of those interested in the growing of tropical and semi-tropical fruits, as well as for the convenience of this Department.

H. E. VAN DEMAN,

Chief of Division of Pomology.

Hon. J. M. RUSK,

Secretary of Agriculture.

ERRATA.

Page 5. There is subsequent and reliable information that "Satsuma" plum is not native in the province of Satsuma, Japan, but farther north.

Page 52. The foliage of *Carica Candinamarcensis* should be said to resemble that of *C. papaya*, and not that of the "ordinary papaw of the north."

Page 71. Sustain orange should be described as "having the navel mark."

Page 79. Kin-Kan—The description should read, "A highly esteemed variety from Japan."

Page 129. See report for 1884 of the Agricultural Department of the University of California, instead of "Report of the California Hort. Com. of 1887." *Lecanium*, not "*Secanium*."

TROPICAL AND SEMI-TROPICAL FRUITS IN FLORIDA AND THE GULF STATES.

SIR : I have the honor to submit the following report on the "Condition of cultivated Tropical and Semi-tropical Fruits in Florida and the Gulf States."

My observations, necessarily, are more especially confined to Florida, not from any desire to detract from the great advantages of our sister States, but on account of greater familiarity with the soil, climate, and products of Florida than with those of the other Gulf States.

The division of tropical fruits, too, will be found to mention fruits whose culture, except under glass, will necessarily be confined to south Florida, and some to the extreme lower keys and main-land of the peninsula. Some fruits will be found mentioned and described that are scarcely yet known in Florida, but are here described to draw attention to their culture, as being likely to be profitable.

It is hoped that the many deficiencies in the preparation of this work will be overlooked.

Our thanks are due for the kind assistance rendered us by Mr. D. G. Watt, of Pinellas, Fla.; Maj. A. J. Adams, Manatee, Fla.; Mr. E. L. St. Ceran, Ponchatoula, La.; Mr. A. H. Manville, Jacksonville, Fla.; Mr. G. L. Taber, Glen Saint Mary, Fla.; Prof. A. H. Curtiss, Jacksonville, Fla.; Mr. W. C. Steele, Switzerland, Fla.; Mr. D. Redmond, Jacksonville, Fla.; Mr. W. A. Marsh, Orlando, Fla.; Mr. A. L. Duncan, Dunedin, Fla., and others.

Much information has also been obtained from the leading nursery catalogues of the South and West; also from standard works.

TROPICAL FRUITS.

PINE-APPLE.

(*Bromelia ananas*, Linn.; *Ananassa sativa*, Lindley.)

So near as we can learn the culture of the pine-apple in Florida was first begun, at least to any extent, by Mr. Benjamin Baker, of Key West, who, about the year 1860, procured slips from Havana, and planted out a small patch, as an experiment, on Plantation Key. The almost fabulous profits realized by Mr. Baker for the first few years soon in-

duced others to plant out more, and so the industry has strengthened, until now it would be a labor of weeks to get reasonably accurate statistics as to the total acreage planted out to this crop in the State.

The cultivation of the pine-apple is, of course, confined to those localities practically exempt from severe frosts, as even a light white frost is detrimental to the growth of the plant. The bulk of the crop is produced on Key Largo, Plantation Key, and upper Maticombe, though there are extensive young plantations on Indian River and on the lower Gulf coast. In Orange and Lake counties, the pine-apple is grown for home use to a considerable extent under low sheds constructed of pine tops or palmetto leaves. General Sanford, at Belair, near Sanford, has more than an acre covered in this manner.

With few exceptions, all the pine-apple plants of the main-land of Florida were killed to the ground by the great freeze of January, 1886, while in many cases on Key Largo and the other keys the leaves of the plants were whitened.

In most of the plantations on the main-land there was practically no crop of fruit produced in the summer of 1886, and of course what few fruits were produced were small, flavorless, and of no commercial value. The crop on the keys was retarded in ripening from one to two months, and the fruit that did ripen was undersized, and fell considerably off in quantity produced.

This year the suckers which sprang from the roots of the old plants (those killed down by the freeze of 1886) have again reached a bearing size, and a good crop is being produced in the protected "pineries" of Orange County, though it is later in ripening than usual. On the keys the crop is fully up to the average, and is ripening as early as in the years past.

The breaking out of the yellow-fever in Key West in May, during the height of the pine-apple-shipping season, completely demoralized the pine-apple market for nearly a month. Most of the fruit is brought from the upper keys to Key West for shipment; almost every planter owning and running one or more schooners.

At the first breaking out of the fever, withdrawal of steamers and absurd quarantine regulations, etc., completely stopped the shipment of pine-apples, which were then daily arriving in Key West by the schooner-load. These were at first given away to any one who would take them; but finally the authorities became alarmed at the quantity of fruit that was rotting on the wharves and in the streets, and tons of fruit were thrown into the Gulf at their order. By the 20th of June, when the panic had somewhat subsided, shipments were again commenced, but not until after many tons of the fruit had rotted in the fields. Taken altogether, the season has been a most unfortunate one for the pine-apple farmers of the keys.

The amounts realized from the sale of pine-apples have of course diminished as the industry became well established, and the high prices

obtained by the first cultivators of the fruit have become a thing of the past. The farmers of Key Largo claim that a fair profit is made when they can sell their fruit in Key West at 5 cents each. In June of this summer pine-apples were selling on upper Matacombe and Key Largo at 25 to 50 cents per dozen for Red Spanish, \$1.20 per dozen for Sugar-loafs, and 50 cents apiece for Porto Ricos. Tons of the fruit had rotted in the fields, but shipments have again been resumed.

The soil on these keys, wherever the pine-apple thrives the best, consists of nothing but a very thin stratum of leaf mold, produced by the decayed leaves of the natural forests, underlaid by coralline rock, which, indeed, is frequently not covered by any soil at all. A new clearing is made every year, brush and logs are burned, and the land set out to "slips," without any previous digging or cultivation whatever. It is impossible to use either hoes, plows, or any of the ordinary agricultural implements on account of the ever-present rock. The slips are stuck in at random, from 18 inches to 3 feet apart, wherever a niche in the rocks will accommodate them, or where enough soil can be scraped around the base of the slip to keep it from falling over. They never receive any further cultivation than the pulling of weeds by hand; a difficult and disagreeable employment when the plants become of any size, owing to the sharply-serrated leaves of the plants.

The planting is usually done in July or August, and the first crop of fruit produced the second spring after (about eighteen months from the date of planting.)

When "suckers" are planted, a small crop of fruit is produced in the following spring or summer. The pine-apple on the keys usually blossoms in January or February, perfecting the main crop of fruit from April to June.

At about the time of the first planting of the pine-apple slips the same clearing is also planted out in some tropical fruit-trees, usually limes, alligator-pears, sugar-apples, or sapodillas, 15 or 20 feet apart, and in five or six years, when the pine-apple plants have appropriated the most of the strength of the soil and have become no longer worth the trouble of weeding, the fruit trees have become of a bearing age, and produce fruit for a number of years in great profusion, but of small size and comparatively poor quality.

In ten or twelve years from the time of the first planting the pine-apple plants are usually entirely dead, and the ground occupied by the trees, while the pine-apple fields encroach each year on the virgin forest lands.

On Indian River and the Gulf coast the pine-apple is grown on the ordinary sandy soil peculiar to south Georgia and Florida with good results. Commercial and home-made fertilizers are applied with benefit. Here the plants are usually set out in rows 2 by 2 or 2 by 3 feet, and given thorough cultivation.

The plants are known as "crowns," "slips" or "sets," and "suckers."

The crowns or tops are cut or twisted from the top of the fruit. Occasionally a dozen or more little shoots appear around the base of the crown, called crownlets. In the case of scarce varieties these also are planted, making as good plants in the end, though taking a longer time. The slips are the shoots from around the base of the fruit. These are ordinarily planted. Each fruit spike produces from five to twelve slips. When the pine-apple is ripe it is cut just above the slips, leaving the slips on the stem. The slips continue to grow, and are usually left on a month or more after the fruit is removed to attain larger size before planting. The crowns and slips produce their first crop the second season after planting. By the term "suckers" is understood the shoots appearing near the root of the plant, which are the largest of all. These produce a light crop of fruit the first season after planting, but are not regarded as producing so healthy plants as the slips. The crowns are rarely sold, except of the choice varieties. The slips of the common Red Spanish variety are worth on the lower keys from \$4 to \$6 per "hundred dozen" (all counting is done in Bahamian style). On the Gulf coast and on the Upper Indian River they sell for \$10 to \$15 per thousand. Suckers are worth about twice as much.

Owing to the prevalence of mosquitoes on the keys, and the rough rocky character of the soil, no horses or wagons can be employed, and although there are plantations of one or two hundred acres in extent, and pine fields sometimes half a mile from the wharves, all fruit and slips are carried in large Cuban-made baskets, usually on the heads of negroes. Colored labor is employed to a considerable extent, usually from Bahama.

It seems to me that one great furtherance of the future profitable production of pine-apples on the keys would be the establishment of lines of coasting steamers of light draught, by which means the fruit could be distributed up along the Atlantic and Gulf coasts at various ports, where West Indian fruit is rarely landed, and by this means reaching many southern localities where at present a pine-apple is almost an unknown fruit. At present, except small quantities of fruit carried by coasting schooners up along the Florida coast, the entire crop of the keys goes to New York to compete with West India fruit and the fruits of the world.

It would seem to me also that if a more intensive system of cultivation could be inaugurated on the keys, it would be much better than the rather "slip-shod" manner of cultivation now practiced. If parties would cultivate smaller areas, planting out only the choicest varieties of pine-apples, and cultivating and fertilizing in the best possible manner, the proceeds would be more satisfactory. Fancy fruit, put up in a neat and attractive manner, will always command fancy prices. The pine-apple is a good shipper for a tropical fruit, the common varieties undergoing rough handling, and frequently, if cut when "full" but not yet yellow, keeping as long as three weeks.

The only work known to us on the culture of the pine-apple in Florida, for those who intend to plant this fruit, is an able treatise, which has been published from time to time in the Florida Dispatch (of Jacksonville, Fla.), by Rev. James H. White, of Merritt's Island, Indian River. We believe it has not been published in pamphlet form.

As far as our knowledge extends, the only insect enemy which the pine-apple has in Florida is a scale insect, which seems to be identical with the "white mealy crimson-tinged insect" of Speechly. The scientific name of this scale is *Dactylopius adonidum* (Linn). Although found to some extent on pine-apple plants everywhere, it seems to do no serious damage when the plants are kept in a healthy growing condition. It infests the roots, leaves, fruit, and every part of the plant. Speechly gives a remedy (Vine and Pine-apple Culture, p. 321) for destroying this scale in the English hot-houses, but we do not think it ever does serious damage to healthy growing plants in Florida.

VARIETIES.

The principal variety in cultivation in Florida is the Red Spanish, also known by the names Black Spanish, Scarlet Key Largo, Havana, Cuban, Strawberry, etc. Probably nine-tenths of the pine-apples produced in Florida are of this variety. It is the ordinary pine-apple of export; fruit short, somewhat tun-shaped or bulging in the middle, ruddy yellow when ripe, protuberances generally swelled very large. Flavor subacid, sparkling; a good fruit when well ripened.

Green-leaved Sugar-Loaf.—Fruit of pyramidal shape. At first pale green, but when near ripe changing to a fine yellow. Flesh firm, deep yellow, sweet, and of exquisite flavor. Grown to some extent on Key Largo.

Porto Rico.—Plant very large and strong-growing, attaining a height of 3 to 4½ feet. Fruit very large, attaining a weight of from 6 to 15 pounds, according to cultivation and location. Protuberances very large; flavor subacid and delicious. Grown to a slight extent on Key Largo.

Of the following additional list of varieties some are in cultivation in the "pineries" of middle Florida and on Indian River:

Anson's.	Blithfield Orange.
Antigua Queen.	Blood-red.
Black Ripley.	Downton Havana.
Black Antigua.	Egyptian Queen (a favorite of Indian
Bird's Eye (cultivated to some extent	River cultivators).
on Indian River).	Enville Queen.
Black Jamaica.	Enville.
Buck's Seedling Globe.	Fisherwick Striped Globe.
Brown-leaved Sugar-loaf.	Green Antigua.
Brown Sugar-loaf.	Green Java.
Black Sugar-loaf.	Green Providence.
Buck's Seedling.	Globe.

Green Queen.
 King.
 Lemon Queen.
 Lord Bagot's Seedling.
 Lady Beatrice.
 Lord Carrington.
 Montserrat.
 Moscow Queen.
 Mealy-leaved Sugar-loaf.
 New Demara.
 New Enville.
 Orange Sugar-loaf.
 New Jamaica.
 Otahciti.
 Prince Albert.
 Providence.
 Queen.
 Rough or Spine-leaved Cayenne.
 Ripley.
 Russian Globe.
 Russian Coxcomb.

Ripley's Queen.
 Scarlet Queen.
 Smooth Cayenne.
 Smooth Havana.
 Striped Smooth-leaved Sugar-loaf.
 Striped Surinam.
 Sierra Leone.
 St. Vincent.
 Surinam.
 Striped-leaved Sugar-loaf.
 Striped Queen.
 Silver-striped Queen.
 Trinidad (Pitch Lake).^{*}
 Thompson's Smooth Cayenne.
 Trooper's Helmet.
 Spring Grove Enville.
 Welbeck Seedling.
 White Ripley.
 Wave-leaved.
 White Providence.

It is worthy of mention, in connection with their cultivation on the keys, that but a part of the crop of pine-apples is considered marketable, as all "pines" with a girth of less than 12 inches (diameter of a little less than 4 inches) are rejected by the buyers and shippers as unfit for shipment.

SAPODILLA, SAPODILLA PLUM, OR "DILLY."

(*Achras sapota*, Linnæus; *Sapota achras*, Miller.)

The sapodilla grows and fruits to perfection in the southern coast-belt of Florida, more particularly on the keys. It has been grown in Key West for many years, where it is now one of the principal fruit-trees in cultivation.

The tree is low and spreading, rarely growing to a height of more than 20 feet, though with a spread of 25 feet or more. The leaves are oblong-lanceolate (about the size of an apple leaf or a little larger) and exceedingly thick and glossy; the flowers are small and insignificant; the fruit, which is produced throughout the year, is usually of the size, shape, and color of a Russett apple, with the taste of a rich, juicy pear, combined with granulated sugar. The sapodilla tree, like many other sapotaceous trees, yields gutta-percha. The fruit, if picked green, will stand shipment, but will not keep the delicious flavor peculiar to it when ripened on the tree. It is probable that with the modern improved system of refrigerators the sapodilla could be shipped in perfect order to the northeastern seaports, and even to interior points, as a consider-

^{*} This celebrated variety is grown in great perfection by General Sanford and other Orange County growers. The slips are worth in Orange County about \$10 per dozen. Fruit of this variety is produced occasionally during winter, and of course brings exceptionally high prices when shipped at that season.

able trade is developing in the transportation of most delicate tropical fruits in improved refrigerator ships between British West Indies (and even British Guiana) and London.

The cultivation of the sapodilla in the Gulf States is confined strictly to south Florida. The sapodilla will bear as much or more frost than the ordinary guava, but on account of extreme slow growth it will not recover from the effects of cold weather so soon nor so surely as the guava. Its cultivation, therefore, will be limited to the main-land and keys of south Florida below Charlotte Harbor and to those regions north of this that are protected naturally by bodies of fresh or salt water. This will include localities on the main-land along both the east and west coasts, the keys and Islands, up to Tampa Bay and Cape Canaveral, and a few favored locations in the lake region of Polk, Orange, Sumter, and Lake counties. Previous to the freeze of January, 1886, the sapodilla produced fruit as far north as Tampa, and on the Manatee River half a dozen trees were fruiting. The freeze of that year (1886) killed to the ground most of the sapodilla trees growing north of Charlotte Harbor, while below the Caloosahatchee River they were injured none or but little.

Mr. Samuel Litchfield, of Manatee, had growing on his place three fine trees nine or ten years old which had been bearing several years, and one of which had produced specimens of over a pound in weight which is an unusually large size. At the time of the freeze Mr. Litchfield kindled a fire on the north side of these trees at dark, which was kept burning until 2 o'clock. In despair of saving the trees the fire was then allowed to die out. The trunk and lower branches (with leaves) of the best tree were saved intact. The tree has again produced a light crop during the past summer, and has almost regained its original head of foliage. It is probable that had the fire been kept up, all the trees, at least the trunks and lower branches, might have been saved. Vigorous shoots soon appeared from the roots of the two other trees, which are again fast forming trees.

A valuable precaution in the case of the sapodilla, and nearly all tropical trees growing in regions liable to occasional frosts, is the banking up of earth, in the fall, at the lower part of the trunk of the tree, in which case, if frozen down, enough of the trunk may be saved from which sprouts will spring; or, better still, on occasion of an anticipated freeze, the placing of bottomless barrels or boxes around the trunk and filling the intervening space with earth. In this latter way the trunk and lower branches may often be saved.

The planting of the sapodilla on an extensive scale will doubtless be confined to regions south of Charlotte Harbor, where serious frosts rarely occur.

Among the most healthy and best sapodilla trees in Florida are those of Mr. Collier, at Marco. These trees were not injured in the least by the freeze of 1886, though the thermometer sunk to 28° F., and many

other tropical trees were injured to a greater or less extent. There are several fine orchards of sapodilla trees in Key West, and nearly every yard contains from one to half a dozen trees, some of them very old. Mr. Vincent Pinder, of Boca Chica, has a large orchard of sapodillas, and on Key Largo there are many acres of them, planted in the old worn-out pine fields. The trees, however, on Key Largo and Plantation Key are much less healthy and productive than those at Marco and Key West, owing to the scantiness of the soil and lack of proper fertilizing. The kind produced on the key finds a ready market in Key West.

VARIETIES.

As the sapodilla is propagated altogether from seed, and there is a great difference in size, shape, and quality of the fruit, as well as in manner of growth of the trees and shape of the leaves; but the only well-marked varieties seem to be the round-fruited and oval-fruited, which do not differ essentially in taste.

MAMMEE SAPOTA.

(*Lucuma mammosa.*)

The mammee sapota is a native of the forests of Central America and the West Indies. It is a tree of gigantic dimensions when full-grown, and is also known as the marmalade tree, or marmalade-box. The tree is evergreen, with very large leaves, much resembling those of the loquat—*Eriobotrya Japonica*. It produces large, brown, oval fruits, from the size of a goose egg to that of a musk-mellon. A thin, rough, leathery rind surrounds the pulp, which is of a bright-red color, and incloses one to three very large glossy-brown seeds, which extend nearly the whole length of the fruit. The fruit is sliced, and eaten like a musk-mellon, but without salt. The taste is very much like that of a rich pumpkin pie, and the fruit is much appreciated in the tropics. The Cuban fruit retails at about 40 cents per dozen in Key West. There are many young trees in south Florida, but we know of none bearing, though there are possibly some on Key Largo. So far as we know there is nothing to prevent the culture of this fruit wherever the sapodilla can be grown, as it seems to be as hardy as the sapodilla, and to sprout from the root much more readily when killed back by frost. The fruit will stand shipment of a week or more.

WILD SAPODILLA.

(*Mimusops Sieberi.*)

This tree is found native on the lower keys, where it attains a height of 40 feet, and a stem-diameter of from 1 to 2 feet. The foliage is not unlike that of the cultivated sapodilla, and the small, berry-like fruit is of delicious taste, and most appreciated by those who live on the keys.

It is a fruit, together with many other neglected tropical species, undoubtedly worthy of test-cultivation with a view to the improvement of the fruit.

EGG-FRUIT.

(*Lucuma rivicosa* var. *angustifolia*.)

This fruit is known as "Ti-ess" in Key West, as "Caniste" or "Canistel" in Cuba, and as "Tomot" or "Cancilla" locally on the west coast. It is still a rare tree (a native of tropical America), and in Florida yet but little cultivated. Previous to the "freeze" a specimen had been growing in Tampa for many years, which, after many discouragements by frost, finally produced fruit a few years ago. A large tree is growing at Marco, which seemingly had perfect blossoms every year, but has never yet perfected fruit. Occasional specimens may be seen on the keys.

The tree is a beautiful evergreen, with glossy leaves, smaller, but bearing a family resemblance to those of the mammee sapota.

The fruit is a "small edition" of the mammee sapota, with pulp tasting like a hard-boiled egg. The fruit always sells well in Key West, and the tree might be more generally cultivated with profit, as it is fully as hardy as the sapodilla and other of its congeners. So far as we know, the tree and all of its congeners of the family Sapotaceæ are entirely without insect enemies.

STAR-APPLE.

(*Chrysophyllum cainito*.)

Here we have another sapotaceous tree, as yet not often planted in Florida, except on the lower range of keys. A description of the foliage is best given in the few enthusiastic words of Charles Kingsley: "And what is the next, like an evergreen peach, shedding from the under side of every leaf a golden light—call it not shade? A star-apple."

The star-apple tree ultimately attains a height of 30 feet, and is a profuse bearer. The fruit is of the size of an apple, though nearly as smooth and round as a billiard ball. They ripen in April and May. When cut into halves transversely the fruit discloses a greenish or purple pulp, with whitish, star-shaped "core," containing from four to ten brown seeds as large as pumpkin seeds.

Picking when green destroys the flavor; when ripened on the tree they are sweet and good, most people liking them at first taste. In Jamaica, a mixture called "matrimony" is made by scooping out the inside pulp and putting it into a glass with the juice of a sour orange. Star-apples are worth from 15 to 30 cents per dozen in Key West, and there is a good demand. When small, the tree is not apt to sprout up again if killed back by frost, and is perhaps somewhat more tender than the sapodilla. There are two principal varieties, the Purple, of

which the skin and entire pulp are bright purple, and White, which has a greenish-white skin and pulp. This variety is often of larger size than the purple, sometimes attaining a diameter of 4 inches in the West Indies. In taste there is but little difference between the two varieties.

SATIN-LEAF.

(*Chrysophyllum oliviforme*.)

This is a native of the West Indies, and is sometimes found on the lower Florida keys. It was discovered here, botanically, by Dr. Chapman, while collecting the woods of Florida for the centennial exhibit. It is a magnificent evergreen shrub, even more beautiful than the star-apple. The fruit is of but little value until improved by cultivation.

SUGAR-APPLE, OR SWEET-SOP.

(*Anona squamosa*.)

Few fruits are more popular than this in extreme south Florida, where it is grown to a considerable extent. All the bushes north of Charlotte Harbor that were not thoroughly protected were killed to the ground by the freeze of 1886, but many sent up vigorous healthy sprouts again. The specimens at Marco were practically unharmed, owing to their large size and healthy condition.

The fruit is of the shape of a pine cone, three or four inches in diameter, and is of a yellowish-green color when ripe, and covered with small scaly protuberances much resembling those of the pine-apple, whence the name *squamosa*—meaning scaly. The pulp is of a creamy yellow color, and contains numerous thick black seeds as large as a navy bean. In taste it is like a delicious custard, very sweet, and to the novice apt to be unpleasant at first. The shrub is of a low bushy growth, rarely attaining a height of more than 15 feet. It is very prolific, small plants only three or four years old and less than 5 feet in height having been known to ripen 30 or 40 fruits in one season, as far north as the Manatee River. The sugar-apple, being of low growth, can be managed under such sheds as are used in Orange County for the pine-apple, and are then reasonably safe from frost even in middle Florida, except in case of unusually cold weather. Like many of the Anonas, the sugar-apple is deciduous or nearly so. The farthest north that we have information of the successful fruiting of the sugar-apple in Florida, is at Norwalk, in Putnam County, where it was fruited before the freeze, by Mr. Thomas P. Frank. There were many old bearing specimens on the south side of the Manatee River, previous to the freeze, where the fruit sold locally for 60 cents per dozen.

The finest trees on the west coast are at Mr. Collier's, at Marco, on high shell hammock. At Key West it is a common tree in the yards, and is also grown more or less along the Indian River as far up as Cape

Canaveral. On Plantation, Largo, and Matacombe keys, it is grown extensively for the Key West market, being planted in the worn-out pine fields. The sugar-apple is no exception to the general rule of fruit-trees in preferring high well-drained land for its perfect development. The only disease, if disease it may be called, to which the tree seems to be subject, is a decaying of the roots from the bottom upwards in winter, when the plant is nearly dormant. The only cause to which we can ascribe it is planting in land not perfectly drained, though the continued cool weather of some of our winters may partially cause it.

There are no well-marked varieties of the sugar-apple other than the common form.

CHERIMOYA, OR JAMAICA APPLE.

(*Anona cherimolia*; *A. tripetala*; *A. Humboldtiana*.)

The cherimoya in Florida is confined to about the same territory as the sugar-apple, and is grown to about the same extent on the lower keys, though it has formerly not been so commonly grown along the Indian River and Gulf coasts as the sugar-apple.

The fruit varies from the size of an ordinary apple to 6 inches in diameter. Indeed in its native home (Peru) it is said sometimes to attain a weight of from 14 to 16 pounds. The color when ripe is brownish-yellow, sometimes with a rich red cheek. The shape is not unlike a very large Fall Pippin apple, but with no depression, except at the stem end. The skin is thin, nearly smooth; flesh quite rich, creamy, and abundant; very sweet, but hardly so apt to be relished by the novice at first as the sugar-apple. Seeds many, in the outer part of the pulp, as in all the anonas. They resemble those of the sugar-apple, but are a trifle lighter brown in color.

The foliage of the cherimoya is of a light yellowish-green, thicker and more glossy than the leaves of the sugar-apple, and very much larger—often 4 or 5 inches in length. The tree is of a stouter and more upright growth, and attains a larger size than the sugar-apple. It seems to be rather more hardy than the sugar-apple. It is grown in the milder coast regions of Spain, and we have read in a late agricultural paper that it has ripened fruit in southern California. The tree is deciduous, and there are no prominently-marked and well-known varieties.

SOUR-SOP.

(*Anona muricata*.)

This is the "Guanabana" of the Spanish West Indies, where it is native. The tree is one of the most tender as well as the most beautiful of all of the anonas. The leaves are as large as those of the apple, of richest glossy green, and the tree attains the size and height of an ordinary peach tree. The fruits are very large, ordinarily weighing from

2 to 4 pounds; the shape is irregularly oblong, bluntly pointed at the extremity; color, dark green externally; the rough skin broken into scales, which end in feeble spines. The pulp is soft, white, and very juicy, and of a peculiarly flavored acid or subacid taste. To the northern palate the first taste is anything but re-assuring; it has even been compared to a "ball of cotton soaked in turpentine;" but, as is the case with many tropical fruits, the taste for it is gradually acquired, until it is thought delicious. The tree is but little grown yet in south Florida, though the Cuban fruit sells readily in Key West at from 10 to 50 cents apiece. It is much used for flavoring ice-cream, etc., and is also prepared with sugar and water into a cooling drink in much the same way that the lemon, lime, sour pomegranate, and tamarind are used.

The sour-sop fruited previous to the freeze of 1886 as far north as Manatee, in the grounds of Capt. John Fogarty. The tree had never had artificial protection or special care. It is known in the French West Indies as the "Corresol," and by the Indians was known as "Suirsaak," from which the name sour-sop is thought to have been corrupted.

The sour-sop seems to have received more attention and cultivation and to have attained greater size and excellence in Porto Rico than anywhere else, and the Porto Rico guanabenas have almost the fame of the pine-apples of that place. The wood and foliage of the sour-sop, as is the case with all anonas, has a strong and somewhat disagreeable odor.

POND-APPLE.

(*Anona glabra*, or *Laurifolia*.)

This species has for some years been erroneously called the "Custard-apple" in south Florida. It is a native in the swamps, both salt and fresh water, of south Florida, from the headwaters of the Manatee River to Matacombe, and up along the Indian River. It is one of the commonest trees of the everglades, and is often met with in cultivation. North of Charlotte Harbor the trees suffered considerably by the freeze of 1886, but have now grown out vigorously, and are occasionally fruiting again on the young shoots. The tree is also common throughout the West Indies and on the main-land of Honduras, and is perhaps identical with the *Anona palustris* of Cuba.

The tree is more inclined to be an evergreen than most species of *Anona*, especially when young. The leaves are a beautiful glossy green, large, thick and smooth, as the name implies. The fruit is somewhat conical, with blunt point (not unlike a Bellflower apple in shape), and when ripe the large stem pulls out of the fruit, leaving a hole half way through it. The color is yellow, or brownish-yellow, on the outside; pulp a rich cream-color, and contains the large allowance of seeds usually found in the Anonas. The whole fruit is delightfully fragrant, and its flavor is liked by many, though it is held in least estimation of any of the *Anona* fruits,

CASHEW-NUT.

(*Anacardium occidentale*. Maranon, of the Spanish West Indies.)

We give entire a description of the Cashew-nut from the Florida Agriculturist for March 12, 1884:

A tree of the natural order of Anacardiaceæ, a native probably of the tropical parts of both hemispheres, although it has been commonly regarded as of American origin. It is a spreading tree of no great height. It abounds in a clammy, milky juice, which turns black on exposure to the air, and is used in India for varnishing, but it is so acrid as to produce painful inflammation when it comes in contact with the skin of persons, or when they are exposed to its fumes. The fruit of the tree is a kidney-shaped nut about an inch long, seated on the thicker end of a pear-shaped fleshy stalk, from which the botanical character of the genus is derived. The shell is double, the outer shell being ash-colored and very smooth; and between it and the inner one is a layer of a very caustic black juice. The kernel is oily, and very pleasant and wholesome, and is in common use as an article of food in tropical countries, being made into puddings, roasted, and in various ways prepared for the table. In the West Indies it is put into wine, particularly old Madeira wine, to which it is thought to communicate a peculiarly agreeable flavor. It is also, for the same reason, sometimes an ingredient in chocolate. Yet the vapor which arises from it in roasting, but which is derived from the coating of the kernel and not from the kernel itself, is so acrid as to cause erysipelas and other painful affections of the face in those who conduct the process, unless great caution is used. The fleshy stalk, sometimes called the *cashew-apple*, varies in size, being sometimes not much larger than a cherry and sometimes as large as an orange, and is white, red, or yellow. It is perfectly free of the acidity characteristic of the natural order, is acid and eatable, very pleasant and refreshing, and much used by the inhabitants of the countries in which the tree grows. A very pleasant vinous liquor is obtained from it by fermentation, and this by distillation yields a spirituous liquor highly esteemed for its flavor. A gum which exudes from the bark of the tree, quite distinct from the milky juice already mentioned, is black, but otherwise very similar to gum arabic.

The cashew-nut, though an exceedingly tender plant, will often winter in the open air as far north as Manatee, though extreme south Florida is best suited to its cultivation. It has as yet received but very little notice in Florida, though it has fruited in a few instances. The tree bears fruit when very small, and may be easily cultivated and fruited in greenhouses. The first seeds or plants probably brought to Florida were distributed by Colonel Codrington, of De Land, at that time editor of the Florida Agriculturist. There is probably no hinderance to its successful cultivation on the lower keys.

CARAUNDA.

(*Carissa carandas*.)

This is occasionally met with in south Florida, grown as an ornamental shrub. It is a native of India, where it is appreciated for the sake of its cherry-like fruits, which are used when green for pickling, and when ripe for tarts and preserves. The shrub is half hardy in middle Florida, and might prove valuable as a hedge plant, the large branched thorns being very formidable. It is locally known as "Christ-

thorn." The flowers are large, white, and fragrant; the fruit does not seem to be very freely produced in Florida; it is of a reddish color, and an inch in diameter. The tree, or shrub, thrives best in a dry well-drained situation. It is evergreen, with dark-green thick glossy leaves. Another species is *Carissa arduina* (*Arduina grandiflora*), a native of Natal, in Africa, where it is known as the "Amatungulu." This species was introduced from Australia, several years ago, by Mr. Theodore L. Mead, of Oviedo, and it produced fruit at his place in Eustis, Orange County, for several years previous to the freeze of January, 1886. It bears sharp frosts unharmed, and had never been injured previous to the freeze. The fruit is red, cherry-like, and of delicious taste. It is said to make an excellent preserve. In appearance the shrub closely resembles its congener *C. carandas*; it is very thorny, and of comparatively slow growth. It sprouts readily from the roots when frozen back, and really merits quite extensive cultivation.

COCOA-PLUM.

(*Chrysobalanus icaco*.)

This fruit is occasionally met with in cultivation. It is native in the West Indies, and in south Florida as far north as Kettle Harbor, on the west coast. It is well worth cultivation, as an ordinary bush or tree for the beauty of its thick, glossy, evergreen foliage and delicately-colored white and rose-tinted plum-like fruits. It takes its name from the resemblance of the seeds to the shape of the cocoa-nut. The fruit is sometimes eaten, but it is astringent, and of but little value, unless improved by selection and cultivation.

STRAWBERRY PEAR.

This is the fruit of *Cereus triangularis*, a tall climbing cactus of tropical America, with large triangular stem, and one of the largest, handsomest flowers of all the night-blooming species of *Cereus*. The scaly buds of this cactus are known among the Jamaican peasantry as "God-ochro," and are used by them as a culinary vegetable—particularly as an ingredient in soups. They were formerly used in the preparation of the celebrated West Indian "pepper-pot." The fruit of the strawberry pear contains a pleasant sweet pulp, inclosing numerous black seeds. The *Cereus triangularis* is often seen in cultivation in south Florida, but, although flowering freely, it rarely produces fruit.

CANDLE CACTUS.

(*Cereus serpentinus*.)

The candle cactus is a native of the southern and western keys. It is a night-blooming species, with large handsome straw-colored or white flowers, and producing round fruits of an orange-red color the

size of a walnut. They are often eaten, but are really of but little value. The plant has not been cultivated for its fruit.

SEA-GRAPE, OR SHORE-GRAPE.

(*Coccoloba uvifera*, Jacquin.)

The sea-grape of the salt-water coasts of tropical America, extending in Florida as far north as Tampa Bay and Cape Canaveral, is occasionally, though rarely, met with in cultivation. The tree was pronounced by Kingsley to be without exception the "handsomest broad-leaved evergreen" he had ever seen. The large broad leaves are beautifully veined with crimson. The tree, like the cocoa-palm, likes the vicinity of salt water, but it is highly probable that it can be cultivated with some success in the interior of south Florida in protected localities, or anywhere else, in a suitable climate, at any distance from the sea. The tree is usually low and spreading, but sometimes reaches a height of 20 feet or more. The wood is very hard and heavy, and valuable for cabinet work. The fruit is produced in clusters, and much resembles purple grapes; there is one large seed in the center, and the surrounding pulp is of pleasant taste, and is much appreciated along the Florida coast, where it is eaten raw, or in preserves and jellies. North of Charlotte Harbor most of the trees were severely killed back by the freeze of 1886, and though sprouting up vigorously afterwards no crop of fruit was produced last year or this in this latitude.

PIGEON PLUM.

(*Coccoloba floridiana*, Meisner.)

This is another native tree of south Florida, producing fruits of agreeable taste, mentioned here as perhaps worthy of test-culture. It has a much smaller geographical range than *C. uvifera*, and is practically confined to Florida south of the Caloosahatchee. The leaves are smaller than those of *C. uvifera*, and of light-green color.

PAWPAW, OR MELON PAWPAW.

(*Carica papaya*.)

The varieties of this plant are numerous, differing in shape and color of leaves, size and taste of fruit, etc. There is a variety native in south Florida, along the coast from Tampa Bay southward, with pale-green leaves, and small, almost bitter, fruit the size of an egg, or smaller. The fruits are seldom eaten except by the birds. The variety commonly cultivated in the West Indies and south Florida is of dwarfish habit, leaves of dark green, and fruit the size of a small musk-melon, which it resembles in taste. Another very scarce variety bears immense fruit, of 5 and 10 pounds' weight. The generic name, *Carica*, is said to be from Oaria, where the tree was first cultivated. The plant is a native

of both the East and West Indies and of the west coast of Africa. Like the banana, it is now intratropic around the globe, and in many localities, like Florida and southern Europe, its culture extends far outside of the tropics. The pawpaw is a quick-growing tender plant, blooming and fruiting usually the second year from the seed. The large seven-lobed terminal leaves resemble those of the castor-bean, or of the tropical *Cecropia*. It is very beautiful, almost palm-like in appearance, and rarely branches, unless the stem is broken off, frozen off, bent over, or mutilated in some other way. It attains with age a height of 20 or 30 feet. The flowers are rather small and insignificant, yellow, and appear on the stem at the base of the petioles of the leaves, directly under the crown. The yield of fruit is immense, especially while the plant is young. We have known plants to perfect between 20 and 30 fruits each, from 4 to 6 inches in length, during one fall and winter, and when the plants were but two years old from the seed. The fruit is sliced and eaten raw like the musk-melon, cut up and stewed with sugar (when it resembles apple-sauce), and cooked in many other ways, when either green or ripe.

The pawpaw plant is famous the world over for its singular property of making raw meat more tender. The meat is placed between the bruised leaves of the pawpaw but a short time, or rubbed with the rind of the fruit. The pawpaw is ordinarily dioecious, but in some instances has perfect flowers, as we have known a number of cases where isolated plants bore fruit in profusion.

Though the plant is very tender, it will stand many of our south Florida winters unharmed, and occasionally attain an age of ten or more years, even as far up as Tampa Bay, in locations with good water protection. The young plants, if protected with a barrel, or keg, or anything similar, in case of frosty nights, will bear fruit the following fall and winter. In this manner they can be grown easily as far north as middle Florida. The freeze of 1886 of course killed all unprotected plants in middle Florida, and in many places as far down as the Caloosahatchee. The plant thrives best in a high and dry location. In the wild state it is most commonly found on high shell mounds or shell hummocks. Water standing about the roots for any length of time is almost sure death to the plants. The pawpaw is probably not a fruit that would "take" well in northern markets, and, besides, it is so tender that it will not stand twenty-four hours' transportation when ripe. It is of value, therefore, only to grow for home use. The tree is propagated from seed only, of which the hollow in the large melon-like fruits is full.

OTAHEITE GOOSEBERRY.

(*Cicca disticha*, *C. racemosa*; *Phyllanthus distichas*.)

This is a valuable fruit, sometimes cultivated in south Florida, and deserving of still more extensive cultivation. The tree is quite tender, and its open-air cultivation is limited at least to the territory mentioned

as suitable to the cultivation of the sapodilla. It has produced fruit in Orlando, and for many years in considerable quantity at Manatee. The tree belongs to the natural order Euphorbiaceæ and is one of the most beautiful tropical trees in existence. The leaves are light green, compound pinnate, and made up of many leaflets—the whole leaf being a foot or more in length. The waxy white fruit is produced in clusters like currants, which hang directly from the trunk and large branches of the tree. The individual berries resemble the fruit of *Eugenia uniflora* in shape and size. The fruit is produced in immense quantities, a tree four or five years old often yielding half a bushel of fruit. In taste it is a sharp acid, not usually eaten in large quantities in a raw state, but very highly esteemed for pastry, jellies, and preserves. It ripens in mid-summer, and extends through a season of several weeks.

The new growth of the tree has a faint tinge of wine-color, and the foliage, combined with the quantities of white berries, produces a beautiful effect. The Otaheite gooseberry trees on the Manatee River were killed to the ground by the freeze of 1886, as were all specimens above the lower keys, but they have since sprouted up vigorously. The tree has no insect enemies that we know of.

COCOA-NUT PALM.

(*Cocos nucifera*.)

Cocoa-nut culture has become one of the leading industries of south Florida, promising to rival even the culture of the pine apple on the lower coast and islands. For many years a few trees have been growing at Cape Florida on Indian Key, and in Key West. Some of the cocoa palms in Key West are probably sixty years old or more, and those of Indian Key at least antedate the residence of Dr. Perrine on that island fifty years ago. The oldest large groves on the keys are on Plantation Key, some of which were planted before the war.

The culture of the cocoa-nut in the United States (for profit) will be limited to that part of south Florida south of Charlotte Harbor, as it is one of the most tender palms known as regards frost. It will sometimes stand the loss of its leaves by frost and afterwards recover; but where such frosts are likely to occur, its cultivation for fruit can not be made profitable.

Previous to the freeze of 1886 a young tree had survived six winters at Lake Harris, others were growing in Tampa, and in Maj. A. J. Adams's grounds at Manatee a ten-year-old tree was blooming for the first time. These were all killed outright by the freeze. On the west coast from Charlotte Harbor south the trees generally escaped with the loss of foliage only, though at Mr. W. S. Allen's place, on Chuckaluskee Bay, two large trees, probably thirty years old, were killed, while others near by escaped. On the lower range of keys the injury was not so great, but the milk soured in all the nuts on the trees, thus making the crop

worthless. Since then the nuts have been much smaller than usual, probably the effect of the shock received.

The cocoa palm also exists in a precarious condition on the Gulf front of the parishes of Plaquemines, Terre Bonne, Saint Mary, and Cameron, in Louisiana.

The cocoa palm, as is well known, likes the proximity of the sea, but otherwise is not very particular as to elevation or quality of land on which grown, though of course produces the best results in rich land. The largest cocoa-nut plantations in south Florida are on the main-land, at Cape Sable (where Mr. J. A. Waddell has 42,000 young trees), on Upper Matacombe, Plantation, and Largo keys, and at Biscayne Bay. The oldest groves are on the keys, where there are many acres in bearing trees.

The cocoa-nut palm in full bearing, it is claimed, will produce enough food to support a man in case of necessity, averaging one nut per day throughout the year. This rule, however, can be taken with due allowance, about twenty nuts per month being the average on the Florida keys. The tree blossoms and ripens nuts throughout the year without cessation.

So far as we know the cocoa-nut disease, so destructive in the West Indies during the past few years, has not appeared on the Florida keys. It is thought, however, to have been occasioned by the continuation of unusually dry seasons for several years, and in Florida no unusual drought has been experienced. Neither has the "scaly blight" (thought to be the effect of drought also) made its appearance. Rats have not become the pest among cocoa-nut trees that they are in the West Indies, but it will be well for our growers to "keep their eyes open," and be ready to make war on such pests the moment they appear. In Jamaica wide sheets of zinc are nailed around the trunks of trees, over which the rats can not climb.

Most of the cocoa-nuts produced at present on the keys, and that are not consumed in Key West, find a market in New York.

As suggested in the notes on pine-apples, there is another chance for advancement here, in place of marketing in New York; though of course the cocoa-nut will stand any amount of shipment, and can be more widely distributed than the pine-apple, as it is not so perishable.

The largest young plantation of cocoa-nuts in Florida is probably at Biscayne Bay, where Mr. Ezra Osborne has 300,000 young trees, covering nearly 4,000 acres. Messrs. T. A. & E. A. Hine also have immense young groves on the shores of Biscayne Bay, Sanders Key, and Long Key. The historic Indian Key has also been planted entirely to cocoa-nuts, and miles of coast-line along the Florida keys and lower main-land will in a few years be covered by the waving plumes of this beautiful palm.

The oldest cocoa-nut grove on the main-land of Florida is at the mouth of the Miami River, on Biscayne Bay, which was planted forty years or

more ago, on the site of old Fort Dallas. The trees were originally about 150 in number, but some years ago more than half of them were destroyed by a hurricane, and comparatively few now remain.

VARIETIES.

The varieties of the cocoa palm are described as quite numerous in the East Indies, but the common type of the species seems to be the only one yet grown in Florida. The King cocoa-nut and the Dwarf cocoa-nut are said to be varieties highly prized in Ceylon, neither of them, however, attaining a height of more than 20 feet.

ROSE-APPLE, OR JAMBOSADE.

(*Eugenia jambos*; *Jambosa vulgaris*.)

This handsome tree is a native of the East Indies, though it has been long grown in the West India Islands; and in the Spanish West Indies it is known as *Poma rosa*.

The tree is evergreen, with long and narrow leaves, in shape much like those of an oleander, very glossy and shiny. The new growth, as is the case with so many tropical trees, is of the richest wine-color. The tree is fully as hardy as the ordinary guava, and succeeds on very poor land. It ultimately forms a spreading tree of 20 to 30 feet in height. The flowers come out in late summer, varying in color from a creamy-white to greenish-yellow, and the fruit ripens from December to May. The fruit much resembles a very large Siberian crab-apple, is white or yellowish, sometimes with a delicate red blush on one side; is rose-scented, very fragrant, and with something of the flavor of a ripe apricot.

The tree when killed down by frost sprouts from the root as readily as the guava. The tree is rare in Florida, as the few plants growing in this vicinity were killed down to the ground by the freeze of 1886.

We know of no insect enemies to this tree, or to any of the Eugénias.

CAYENNE, OR SURINAM CHERRY, OR PITANZA.

(*Eugenia uniflora*, syn. *E. Michellii*.)

This is a most valuable fruit tree or bush, almost hardy enough to be classed as semi-tropical, although a native of the equatorial regions of South America. The red cherry-like fruits have a delicious acid taste, and though a hard freeze like that of 1886 will sometimes kill the tops of the plants, it is ordinarily hardy, and produces fruit abundantly as far north as Putnam County, Fla. Some specimens here, though hurt by the freeze, are again fruiting this summer. The tree is quite frequently met with in Orange County and middle Florida, and is gaining in favor as a fruit-bearing plant. The leaves are ovate, of richest bronzy-green, and the new growth of a bright wine-color.

GLYCOSMIS AURANTIACA.

This plant is closely related, and perhaps identical with *Glycosmis citrifolia*, (*Limonia parviflora*). It is from China, and attains a height of 6 or 7 feet, and bears several degrees of frost unharmed. It produces small, red, berry-like fruits. A fine specimen fruited freely for Mr. Bidwell, in Orlando, previous to the freeze, but was then killed to the ground.

MAMMEE APPLE, OR ST. DOMINGO APRICOT.

(*Mammea Americana*.)

A native of the Carribee Islands, now cultivated universally in tropical America. It is a tall-growing tree, with oval, shiny, leathery leaves, somewhat resembling those of the red mangrove; one-flowered peduncles, with sweet-scented white flowers $1\frac{1}{2}$ inches in diameter, followed by large, round, brown fruits 3 to 6 inches in diameter, and containing one to four rough seeds as large as a black walnut without the husk, surrounded by a yellow juicy pulp. The pulp is of delicious flavor, and the taste does not have to be acquired by those unacquainted with it. The taste is not unlike that of an apricot. It is always eaten raw, either cut in slices, with wine and sugar, or sugar and cream, or preserved in sugar. The tree is occasionally met with on the lower keys, where there are some bearing specimens. It is nearly as hardy as the sapodilla. The fruit can be shipped fairly well for a tropical fruit, standing a week or more of transportation. The fruit is popular in Key West, but as yet the market is supplied from Cuba.

SPANISH LIME, OR GINEP.

(*Melicococa bijuga*.)

This West Indian tree, of the family Sapindaceæ, has proved itself capable of bearing several degrees of frost unharmed, but it can hardly be called semi-tropical. It is a tree of slow growth when young, but eventually reaches a height of 20 or 30 feet. The foliage is peculiarly odd; compound leaves with winged petioles, much resembling those of *Sapindus saponaria* (the West Indian soap-berry). It produces a yellow plum-like fruit, the pulp of a pleasant grape taste, and inclosing a large seed, which is often roasted and eaten like the chestnut. The fruit markets well in Key West, and there are a number of fine bearing trees in that place, and on the other islands. It is worthy of more attention all over south Florida.

DOWNY MYRTLE.

(*Myrtus tomentosus*.)

This shrub was first cultivated in Florida by Mr. E. H. Hart, of Federal Point, Putnam County. It is a handsome and quite hardy ever-green shrub, a native of the Neilgerry Hills, of northern India. The

fruits are produced in profusion ; they are red, of the size of a gooseberry, and of an agreeable sweet taste. The flowers are pink, five-petioled, and resemble in size those of the Dog rose, making it a very ornamental plant. It succeeds admirably in Florida, but is not yet much grown. It is a fit companion to the Cattley guava, and, like them, best cultivated after the manner of currant-bushes. In Putnam County the tops were killed down by a big freeze, but have recovered, and are bearing fruit again this year.

CERIMAN.

(*Monstera deliciosa*, *M. per tusa* ; *Philodendron pertusum*.)

This is a rare and highly ornamental aroid plant, a native of the forests of Trinidad. It is a half scrambler, half climber, often in its native forests ascending tall trees, to which it clings with its wiry roots, which come out anywhere on the stem. The large leaves are cut and forked and full of oval holes. It is said of this plant when flowering that "so fast does its spadix of flowers expand, that (as indeed do some other aroids) an actual genial heat, and fire of passion which may be tested by the thermometer or even by the hand is given off during fructification." The plant is rare in Florida, but has been fruited by Dr. Harris, of Key West. It will bear a slight frost unharmed, and it is probable could be cultivated quite extensively in south Florida were more plants obtainable. The fruit is said to resemble very much an elongated green-pine cone. It is about 6 inches in length, and when ripe the skin comes off easily in small octagonal sections, leaving the fruit with the appearance of a ripe banana.* It is said to have the combined flavor of pine-apple and banana, though superior to either.

MANGO.

(*Mangifera Indica*).

Next to the finest varieties of pine-apples, and perhaps also the mango-steen, there is no more delicious fruit in the world than the mango. No fruit stood higher in the popular esteem in parts of south Florida than the mango at the time when the disastrous freeze of January, 1886, killed to the ground every, or almost every tree north of Fort Myers.

The mango is an evergreen, with lanceolate leaves from 6 to 10 inches long and two or more inches broad ; on the new growth they are of a rich wine-color, which gradually changes as the twig hardens up to dark shining green. The tree makes from two to ten separate growths each year, according to age, cultivation, etc., stopping to harden up after each growth. The flowers are produced in loose panicles at the ends of the branches, and are of no particular beauty. The fruit is a large kidney-

* They grow to fully 8 inches in length here in the hot-house of this Department. H. E. Van Deman.

shaped drupe, covered with a smooth, softish, resinous, pale-green, yellow, or half-red skin, and containing one large seed, extending nearly the whole length of the fruit. The shell or outer coat of the seed is rough, fibrous, and compressed. The inside or kernel of the seed is chestnut-like, and in tropical countries is often roasted and eaten in the same manner in which "young America" takes his chestnuts.

In most of the common varieties the pulp of the fruit is full of fibers. This fact often makes the sucking of the mango a more comfortable than elegant process. Indeed, a novice in mango-eating has been known to say that it reminded him of "sucking a ball of cotton soaked in turpentine and molasses." The entire mango tree, leaves, wood, and fruit, have a sweet resinous smell, which the uninitiated liken to turpentine, but after a few trials it usually becomes a delightful fragrance.

The mango tree is a native of India and some other parts of south Asia. It is cultivated for fruit in northern India to an elevation of 3,500 feet in the Himalayas, just outside of the tropics. The tree was introduced into the hot-houses of England in 1690, and probably to the West Indies a few years after, as we hear of its being naturalized there and spreading spontaneously, at least in Jamaica, as early as 1790.

The mango is a most useful fruit; as in countries where it is planted it forms a staple article of food through the hot months—a most healthy food, too, and, besides being eaten raw, is made into jellies, preserves, wine, and even starch and glucose are manufactured from it. Horses, cattle, pigs, goats, and even chickens eat the fruit readily and thrive upon it.

The export of mangoes from Jamaica for the year 1884 was 126,968 fruits, of the value of about \$900, but the trade was then and is yet in its infancy, and is increasing every year. The cultivation of the mango in the United States will be confined in Florida to the belt already given as adapted to the sapodilla.

The mango was introduced into Florida about the year 1840 by Dr. Perrine, who perished in the massacre of Indian Key, but none of the plants introduced by him stood the vicissitudes of fire, war, and neglect, and many years elapsed before the experiment was again tried. Its later introduction was to Point Pinellas, about fifteen years ago, where two seeds were planted, but which did not grow off well. In 1877, however, Mr. William P. Neeld, of the same locality, planted three seeds, two of which grew luxuriantly, and are the parent trees of many of the mangoes growing in different parts of the State. One tree fruited in its fourth year; from the sale of fruit and seeds \$9.15 was realized. The other fruited in the fifth year. Fruit-trees so very prolific as were these two trees during the next two years are rarely or never seen elsewhere. The yield seemed to surpass that of the mango on clay soils in any part of the tropics; the yellow, porous, sandy soil proving perfectly adapted to their healthy growth and fruitfulness.

In their eighth year an experienced orange-grower who saw them estimated that there were 19,000 mangoes on the two trees. Some of these fruits were one pound in weight. "In the mean while three more had come into bearing in his grove, the neighbors had obtained seeds from him, and here and there trees were beginning to bear and raising high the hopes of profit." In all cases where the trees were well cared for they produced from 4,000 to 9,000 mangoes each when once well in bearing. One grower on the point sold from eleven trees in the fourth year from the seed fruit which brought him \$219. In their sixth year he shipped bushels to various places, realizing at Chicago 60 cents per dozen, and the fruit shipping well. Another grower received from the produce of one of his bearing trees \$66 in its sixth year. Many young trees were set out and many coming into bearing.

At other localities than Point Pinellas considerable start had been made. There were fifteen large bearing trees and hundreds of smaller ones between the Manatee River and Kettle Harbor. At Fort Myers and along the Caloosahatchee there were a number of bearing trees, and Dr. Kellum had a large grove set out on the Caloosahatchee. At Orlando there was one bearing tree and many small ones, and other trees were occasionally seen in different parts of south Florida, though on the keys and shell hammocks of the lower coast they do not succeed as well as on the high yellow sandy soil farther north.

Then came the freeze of January, 1886. Every mango tree of any size north of the Caloosahatchee was killed to the ground, and many of them were killed entirely.

Last winter was also very cold in some localities, and many of the small plants set out the previous summer were killed, but in places protected by fresh or salt water on the north or northwest they were not harmed.

It is estimated that on Point Pinellas there are at present not far from 1,000 young trees in the ground, and should another series of our customary warm winters occur it is probable that the number will soon be increased tenfold. Other localities in the south of Florida, where there is good water protection, are not far behind Pinellas in the number of trees planted out. The only fruit produced this year in the State is on the lower key, and there there are but two trees bearing, and none growing so vigorously as they do in the protected parts of Hillsborough, Manatee, De Soto, Brevard, Polk, and Orange counties. Here the only obstacle against their successful culture is the occasional frost, and such a freeze as that of 1886 has been known in the State but once before—in 1835. A sharp white frost does but little comparative damage, except to young trees.

The variety in most common cultivation is the common or "turpentine" mango, really one of the most inferior sorts grown, but much better than "no mango at all."

In 1885 an attempt was made by Rev. D. G. Watt, of Pinellas, to introduce some of the delicious Indian varieties (the finest mangoes in the world are said to grow in India, many entirely without fiber in the pulp, and of such exquisite flavor that they are held in high esteem by every one). A Wardian case was sent to Mr. Watt from Calcutta, containing eight grafted plants of the two best sorts—Bombay and Malde. They were nearly three months on the passage, and when the case was opened five were dead; another died soon after, and the two remaining plants were starting nicely, when the freeze destroyed them entirely. Since then other attempts to introduce the best varieties have been made, and it is probable that within the present year many of the best kinds will have been successfully transplanted to Florida soil.

It is worthy of note that the first mango fruit probably produced in Florida was on a tree belonging to Mr. Tinny, of Clearwater; whether this tree was planted before those at Pinellas or not we do not know. Mr. Jeffords, of the same locality, had a tree that was planted about the same time.

The mango is propagated from seeds and by inarching (or "grafting," as it is often wrongly termed). The seeds lose their vitality in a few days after being taken from the fruit, and this fact makes it exceedingly difficult to obtain seeds of the best varieties from foreign countries. The process of inarching is of course slow and laborious, and only employed in propagating the finest varieties.

When fresh seeds are planted the seedlings soon appear above ground. The pod or shell incloses from two to ten separate germs, each of which may make a tree if the plants are taken up and divided during the first year of their growth, before they have time to grow together; or, though all are compressed into one apparently solid kernel, they may readily be separated without damage to each other, but more usually after the plants are up. The seeds germinate more readily if the shell, or outer coat of the seed, is removed before planting. The process of inarching, as is the case with most fruit-trees, hastens the time of fruiting of the tree, an inarched mango bearing before a seedling. In Florida, however, seedling mangoes usually bear two or three years sooner than they are reported as doing in most other countries where the mango is grown; almost always producing fruit by the fourth or fifth year, and often even the third year, from the seed.

The mango tree succeeds best on high well-drained soil, and is especially successful on the rolling land of south Florida, where the yellow subsoil so favorable for the orange tree is found.

All the fruit raised in Florida previous to the freeze of 1886 met with a ready sale at from \$2 to \$5 per hundred. The fruit may be canned, preserved, or used in almost any way that the apple and peach are prepared. The mango-wood is tough, and in tropical countries often used for various purposes in wagon-making, etc.

VARIETIES.

The varieties of mango are numerous and distinct. Forty or fifty sorts are known in the East Indies and many of the West Indies.

The following are known to be growing in Florida (some of the names are local, and the varieties may possibly be identical with varieties grown elsewhere under different names):

Apricot mango.—The best sort that has yet fruited in Florida. Size, medium to small; color, yellowish-green, with red cheek, and fewer black spots than the common mango. Flavor, rich and spicy, with the taste of a luscious apricot or plum, though superior to either. The turpentine taste entirely wanting. The foliage of an old tree differs slightly in appearance from that of the ordinary mango, though the difference is hardly distinguishable when the plants are young. Fruit ripens from three to six weeks later than the common mango. This variety was much grown on Point Pinellas, and was introduced by Mr. William P. Neeld, whose oldest tree was about seven years old when killed by the freeze.

Apple mango (Mango de manzano).—Very large and pulpy; irregularly apple-shaped; stem depressed in most cases; color of the common mango; almost entirely without fibers, and possessing a certain spicy taste peculiar to the variety. Good sized specimens occasionally measure 5 or 6 inches in length. Introduced from Cuba. Not yet fruiting in Florida.

Lobed apple-mango.—One of the best varieties cultivated in Cuba. Fruit long, with deep furrow or crease on one side, extending the whole length; red-cheeked, with few fibers, and of excellent flavor. The fruit sells in Havana for three or four times the price of common mangoes. Introduced from Cuba. Not yet fruiting in Florida.

Purple apple-mango.—Long, medium sized; color, green, with rich dark-purple blush—no fibers whatever in the pulp; flavor good. Introduced from Cuba. Not yet fruiting in Florida.

Common or turpentine mango.—Large, with more or less black spots; color, greenish-yellow, often with red cheek; skin with some turpentine flavor. Grown commonly in south Florida.

Common yellow mango.—Size, medium; color, rich orange, with fewer black spots than the common mango; flesh, very firm; flavor, rich and sprightly. Not fruiting in Florida that we know.

Curacao.—Not fruiting in Florida.

Guatemala.—An early variety, not fruiting in Florida.

Kallia (from India).—Not fruiting in Florida. Named from the Hindoo word "kala" (black). The fruit is very dark-colored; hence its name of "Blackie."

Kakria.—Another Indian sort not yet fruiting in Florida. Named from "Kakri," the native name of a kind of cucumber. The fruit is pale green when ripe, and very long; hence its name from a supposed resemblance to this cucumber.

Lafsia (from India).—Not yet fruiting in Florida. The name is from "Lafsi," a native mixture of flour, sugar, and clarified butter. The flesh of this mango is supposed to resemble this compound or native sweetmeat.

Manga.—This variety is so called in Cuba, though why we do not understand. It is the feminine form of mango, but as both sorts have perfect flowers, its meaning is not obvious. Shape, nearly round; size, medium; color of pulp and skin, light-yellow or greenish-yellow with no trace of red; contains plenty of the objectionable fibers, but is very sweet and fine-flavored, and preferred by many to any other mango.

No. 11 Mango (from Jamaica).—Not yet fruiting in Florida. The circumstances relative to the naming of this celebrated variety are given as follows by Colonel Codrington in the Florida Agriculturist for June 13, 1883 :

When the French vessel, loaded with tropical fruit from the South Sea Islands for Hayti (then a French colony), was captured by Admiral Rodney, the book containing the local names of the fruits was thrown overboard, and it was only from the numbers on the labels that the fruit was named in English.

This variety is preferred by many to the finest East Indian mangoes, and single specimens are said to often weigh 4 pounds each. The skin is green, pulp of exquisite flavor, rather acid near the seed. Largely grown in Jamaica, where it is gradually superseding the more inferior varieties.

The following are popular varieties in different mango-growing countries, but not yet introduced into Florida :

Amelia : Martinique.

Alphonso : India.

Arbutnot : India.

Arracan : India. One of the sorts grown in the gardens of the agri-horticultural society, Calcutta.

August : India.

Archall : India.

Bombay : One of the finest of the Indian varieties. This variety and the Malda, are the two most popular varieties, in favor with every one who tastes them, while some of the other varieties are delicious to some people and to others unendurable.

Bhadouria : India. A late-ripening variety.

Bindabunnee : India.

Bhutoora : India.

Bell : India.

Bataree : India.

Cedot : Martinique.

China.

Chusokoukea : India.

Cræsus : Martinique.

Desi Bhadouria : India. Very late in ripening, which the name signifies. Valued only on this account.

D'Or : Martinique.

Dodol : The largest Indian variety, the fruit weighing over 2 pounds, usually of the size of a shaddock.

De Cruze's Favorite : India.

Davis : India.

Freycinet : Martinique.

Fifine Gabrielle : Martinique.

Feroghabunnee : India.

Gopal Bhog : India. Deep amber and orange color when ripe.

Goa.

Heenghia : India.

Julie : Martinique.

Jacot : Martinique.

Kidney : Common in Nassau. Skin green; pulp rather watery and very stringy.

Kysopatee : India.

Langeria : India.

Lueknow : India.

Malda: (Syn. *Large Malda*.) India.
 "Size, medium; color, olive-green,
 deep orange color inside." About the
 finest of all.

Martin: Martinique.

Mazagong: India. The fruit of this variety is said to be so delicious that guards are placed over the trees during the fruiting season.

Moorshebad: India.

Mudras: India.

Madame: India.

Nagroo: India.

Peter: India. "Size, medium; shape, almost round, with a projecting heel on one side; color, dull russet, with reddish tinge."

Patheria: India.

Poiget Dore: Martinique.

Sabot: Martinique.

Singapore: India. Large; color, greenish-yellow.

Soondershaw: India. (Perhaps identical with *Soondooria*.)

Soondooria: India.

Sufaida: India.

Tarse: India.

There were upwards of forty varieties of the mango cultivated in Java fifty or more years ago, according to Governor Raffles.

There are no accessible works on mango-culture, though Professor Whitney, in his "Gardening in Florida," devotes a small space to it, and articles on the mango occasionally appear in the leading agricultural papers in the State. In regard to the prospects for fruit, leaving frost out of account, it is probable that an occasional tree in this part of the State will produce a little fruit next year, but fruit in any considerable quantity need not be expected for two or three years at the least.

The oldest trees did not sprout from the root very generally after the freeze, though it is probable that, had they been cut down as soon as the amount of damage could be ascertained and the wound covered with grafting-wax, many more would have sprouted from the roots. The sap in frozen trees seems to sour and kill the live parts of the stem and roots in many cases.

BANANA AND PLANTAIN.

(*Musa*.)

Probably no one of the fruits classed as tropical, is cultivated over a greater extent of territory in the Gulf States than the banana. The reason for this is apparent. The plant is of easy culture, and if killed to the ground by a severe freeze, new and strong suckers soon appear from the roots, and in some cases will fruit the same year. It is found cultivated, therefore, in many places where fruit is not expected oftener than once every four or five years. Then, too, the plants will produce a moderate crop of fruit often when they have been deprived of every leaf by frost during the previous winter. Most banana plants that are in a strong healthy condition will stand a cold as low as 25° F. for a few hours without any further injury than a loss of leaves, and if the stalks are nearly full grown, a shortage on the head of bananas produced afterwards will result.

Indeed, the culture of the banana, as is well known, is universal throughout the tropical world, and in many places extends far outside of the tropics, as in the United States and southern Europe.

In the Gulf States the banana is met with from southern Texas to South Carolina, though it is often cultivated only for its grandeur as an ornamental plant. In Florida its culture for profit is carried on throughout the State with greater or less results. In the neighborhood of Live Oak and Lake City, when favorable season admits of the ripening of the fruit, it sells in most cases for as much as 5 cents per finger, a price greater than is usually realized in New York. At Orlando, and in Orange County generally, they are a comparatively sure crop. The grower sells wholesale at $1\frac{1}{2}$ and 2 cents per finger, and they retail at $2\frac{1}{2}$ cents each. At Manatee the price is 1 cent each, either wholesale or retail, and has not varied to any degree for the past six years. This is also the usual price along the coast as far down as Charlotte Harbor. At Chuckaluskee, Key West, and on Key Largo the price paid will usually average about one-half cent per finger, 20 to 25 cents per head, according to size and variety, and in Key West depending much upon the amount of fruit arriving from Cuba.

Extensive banana growing is not carried on farther north than Putnam County, and even in many parts of south Florida there are but few large patches, though nearly every one has a few plants. The largest growers are at Chuckaluskee, Key Largo, and along other portions of the southern coast and keys.

In the other Gulf States bananas are only occasionally seen. In lower Louisiana the fruit ripens after mild winters as far north as New Orleans, but is inferior to the West Indian fruit in quality.

The banana flourishes best in very moist rich soil, but will not endure standing water about the roots. In Florida the best possible location for a banana patch is on the banks sloping down to a lake, pond, or "bay-head." The springy nature of the soil in such a location agrees perfectly with the roots of the banana, provided they are not planted far enough down to be into standing water. Bananas may be cultivated, however, on high dry land of almost any description with more or less success. Methods of cultivation are as diverse as in the case of the orange tree, some being in favor of a deep and continuous mulching, others with cultivation like corn: still others set the banana plant in a hole 2 feet deep when doing the original planting. Location and soil, however, account in a great degree for these differences in mode of cultivation; different soils requiring different treatment. The banana growers of the lower keys produce fair results with no cultivation whatever except an occasional pulling of weeds and piling them around the plants. At Chuckaluskee the manner of cultivation is exactly like that of corn, though not quite so frequent. Excellent results usually follow heavy and often-renewed mulching.

There are no exhaustive works published in Florida on the culture of the banana, though a short space is devoted to it in "Whitner's Gardening in Florida" (published by C. W. Da Costa, Jacksonville, Fla.; also in Helen Harcourt's "Florida Fruits and How to Raise them," published

by J. P. Morton, Louisville, Ky.). Instructive articles often appear in the columns of State agricultural papers, among which was a valuable one by Mr. E. H. Hart in the Florida Dispatch for August 8, 1887.

The bananas in Florida, in most cases have pretty well recovered from the effects of the freeze of 1886, when they were generally killed to the ground above Charlotte Harbor. Last winter, however, was very severe in most parts of Florida, and the fruit in many localities was frozen, though the stalks were not killed. But little fruit has ripened yet this season, and from now on there will be the usual amount, unless frost prevents.

VARIETIES AND SPECIES.

The nomenclature of the many different varieties and species of the banana is as yet very much confused. The greater number of commonly-cultivated varieties, however, seem to belong to the species *Musa paradisiaca*. In common parlance, the plantain refers to such of these fruits as are improved in flavor by cooking; the name banana applying to those varieties which are esteemed best in the raw state. Most of the following varieties are growing or fruiting in Florida. While we do not claim that the classification is absolutely correct, it is as near so as can be determined without further years of comparison and examination.

Plantain or pisang (Musa paradisiaca, type of the species).—This species is a native of India, but has been cultivated throughout the tropics of the Old and New World from time immemorial. It produces perfect seeds, according to Charles Kingsley and Dr. King, nowhere on the globe except on the Andaman Island, in the Bay of Bengal. It is always propagated by suckers, as are most of the edible species.

The leaves are spotted when the plants are young. The full-grown plant attains a height of 10 to 20 feet, according to circumstances. The fruit attains a length of 8 to 15 inches, and a bunch usually has on it from 40 to 80 "fingers" or fruits. The fruit is improved by cooking. It is a staple article of diet in the tropics. Tons of plantains meet with a ready sale in Key West and Tampa, but all are produced in Cuba.

The plantain has been fruited at Federal Point, Putnam County, by Mr. E. H. Hart, and on the lower keys, but it is rarely cultivated in Florida; the reason why it is not oftener grown is not apparent. Color of fruit, yellow.

Silk plantain.—Said to be a superior variety, grown in Cuba.

Orinoco (synonyms, Horse or Hog banana, El Bobo of Spanish America), *Musa paradisiaca*, var. *sapientum*.—The most common banana cultivated in the Gulf States; one of the most hardy of all, and for this reason often seen in cultivation. The fruit of this banana alone, of almost all edible varieties, can not be picked green and ripened away from the parent stalk without destroying its flavor. To have it in perfection it must be ripened on the stalk until the bananas turn yellow and are almost ready to drop off. The fruit is seldom shipped, and is of most value for home use and local markets. The fruit is shaped like

the plantain, though smaller, rarely more than 6 or 7 inches in length, and with more sharply-angular sides than most bananas. Leaves green, with no blotches. The plant attains a height of 15 or 20 feet with ordinary cultivation. Fruit yellow.

Baracoa (synonyms, Red Jamaica, Red Spanish).—Of taller growth than the Orinoco, and forms a most magnificent plant in favorable situations, attaining the full height of 20 feet or more. The entire stalk and mid-ribs of the leaves are of a rich wine-color; leaves are larger and of a more upright growth than those of the Orinoco. The fruit of this variety is the red or purple banana, so often shipped to the northern markets from the West Indies. It is very prolific, producing bunches double the weight of those of the Orinoco.

To obtain the best results with this variety the most of the suckers should be removed from the main stalk as they appear, thus throwing more vigor into the fruiting stalk or stalks. It is more tardy in blooming than most of the yellow-skinned sorts, and consequently not so valuable to grow in frosty localities, though it is often grown for its great beauty. As an ornamental plant it is perhaps not surpassed by anything in existence, unless it be the Abyssinian banana (*Musa ensete*). The Baracoa banana has stood as far north as Manatee, perhaps farther; but it is not yet in common cultivation in the State.

Hart's Choice (synonyms, Lady-finger, Golden Early, Cuban, etc.), *Musa orientum*.—This banana has proved the best and most profitable variety for general culture in Florida yet introduced. Almost or quite as hardy as the Orinoco banana, it is said originally to have come from Abyssinia; but it has been grown for many years in the West Indies and Bahamas, and locally on the south Florida keys, where it was sometimes erroneously called the "Fig" banana. It was first brought into notice, however, in middle Florida by Mr. E. H. Hart, of Federal Point Putnam County (Florida's most enterprising pomologist), and to whom she owes the introduction of many other valuable fruits. Mr. Hart introduced it from the Bahamas, and finding it as hardy as the Orinoco, and much more desirable, brought it into general notice. In average seasons it bears fruit every year in the latitude of Putnam County. It is a small, delicate, yellow banana, with very thin skin, is very productive, and ripens quicker after flowering than most bananas. The edges of the stalk and mid-rib of the leaves are tinged with red, and the small plants never show the blotches on the leaves peculiar to some varieties. The plant is of dwarfish growth, usually measuring from eight to fifteen feet in height. The flavor of the fruit is spicy, rich, and delicious, and perhaps unsurpassed by any variety yet introduced. The fruit sells in the local Florida markets for almost double the price realized for the Orinoco.

Dwarf banana (synonyms, Chinese and Cavendish, *Musa Cavendishii*, Lambert; *M. regia*, Rumph; *M. Chinensis*, Sweet; *M. nana*, Loureiro).—Probably first introduced by Mr. Atwood, of Saint Augustine,

about twenty years ago, though a few years later it seems to have reached Florida from the Bahamas, and from the Department of Agriculture at Washington about the same time.

Colonel Whitner, of Orange County, was probably the first to grow it on an extensive scale. The plant is dwarf-growing only in height; for, while rarely attaining a height of more than 8 feet and often not more than 5 or 6, the stalk will sometimes measure a foot in diameter at the base, and will support an immense head of fruit of from 75 to 200 "fingers." The fruit is yellow-skinned, longer than the Hart's choice, and with thicker skin. The flavor is fine, and the bananas ship well. The leaves of the young plants are spotted and blotched with red, as are those of the plantain and some other varieties. These blotches disappear as the plant increases in size. It is somewhat more tender as regards frost than the Orinoco variety. The Dwarf banana is a favorite in cultivation along our lower coast and keys on account of its short stocky growth, rendering it less liable to damage from hurricanes and high winds than the taller growing kinds. Chuckaluskee Bay, the Ten Thousand Islands, and Key Largo produce many bananas of this variety, which are marketed in Key West and along the Gulf coast as far up as Cedar Keys. The trade is carried on by means of small coasting schooners. During the past few years this variety has also been extensively planted out in the vicinity of Auburndale and Lakeland, Polk County, and in most cases is doing well in spite of unfavorable seasons.

Fig banana (Musa maculata).—There are many varieties known under this somewhat indefinite name. The true Fig banana, however, is said to be a small-fruited and delicious purple-skinned fruit, the stalk of the plant showing black spots and patches. Fruit very spicy, and of excellent flavor. A tender banana, not profitable for cultivation above south Florida.

Musa magnifica is described by Mr. E. H. Hart as belonging to this class (the "Fig" division). Mr. Hart had a specimen at Federal Point which put out a very large bunch of fruit, but which did not ripen on account of the approach of winter.

Date banana.—This is described as even smaller than the Fig banana, and of excellent flavor. It fruited in middle Florida several years ago.

Dacca banana (Musa dacca).—This is another dwarf species from China, which has been fruiting in European hot-houses since 1838. It is occasionally grown in Florida, and is described as follows by Professor J. N. Whitner:

Fruit small, averaging about 4 by 2 inches; flavor, delicious. The red stripe on the foot-stalk is broad, and a quantity of lime-like powder coats the stem and under side of the leaf.

Golden.—A tall-growing banana, introduced into the Florida keys from the Bahamas by John Gomez, of Pumpkin Key. It resembles the Hart's Choice on a large scale, the leaves and stalks being tinged with

red as in that variety. The fruit is of the size of an Orinoco banana, but more plump, and with blunt end. Flavor described as delicious, surpassing any variety grown on the keys. Fruiting at Chuckaluskee. Color of fruit, yellow.

Chumpa.—Described by Whitner as follows :

The stem of the leaf is tinged with red, which increases to a deep well-defined red along the central leaf-rib. Fruit of a pale straw-color when ripe, and about 6 inches long.

Brazil.—Plant said to attain a height of 20 feet, producing fine fruit, with a vinous flavor. Yellow-skinned.

Tahitia.—Fruit said to be yellow, turning black when ripe; slightly acid taste.

French Dwarf.—Locally grown in south Florida, and to all appearances identical with the common dwarf banana.

Tall French.—Tall-growing variety; leaves spotted while young. Very tender. Rarely grown above Charlotte Harbor.

Rand.—Fruiting in Orange County. Described as immensely productive.

"Apple" and "Silverskin" are local names, probably identical with some of the above varieties.

Large Fig.

Martinique.

The following additional list includes many varieties that are only ornamental, and many not yet introduced into Florida :

Musa Balbisana corniculata.—Described as follows by Von Müeller :

Insular India. Fruits as large as a good-sized cucumber; skin, thick; pulp, reddish-white, firm, dry, sweet; an excellent fruit for cooking. The Lubang variety is of enormous size.

Musa coccinea.—A Chinese species, with upright fruit-spikes.

Musa discolor.

Musa ensete.—The well-known Abyssinian banana; fruit not edible.

Musa glauca.

Musa lancefolia.

Musa Livingstoniana.—Allied to *M. ensete*; mountains of Mozambique.

Musa Martini.

Musa ornata rosea.

Musa rosacea.

Musa Simiarum (syn. *Musa acuminata*, Coll).—This species is described as follows :

From Malacca to the Sunda Islands. About half a hundred marked varieties of this species, called mainly Peesangs in India, are under cultivation there. Though *Musa sapientum* is principally cultivated on the Indian continent, yet it never equals in delicacy the cultivated forms of *M. Simiarum*, the fruit of which sometimes attains a length of 2 feet.

Musa sapientum pruinosa.

Musa speciosa.

Musa superba.

Musa odorata.

Musa textilis. The Manilla plantain. Cultivated on the Phillipine Islands for the fibre it yields.—(H. E. Van Deman.)

Musa troglodytarum, Linnæus (syn. *Musa uranoscopos*, Rumph—Said to be indigenous to India and to the Pacific islands. The fruit-stalk of this species stands upright; "fruits edible, small, reddish or orange-colored; pulp yellow, mawkish." This species was in Mr. Bidwell's collection at Jacksonville a few years ago.

Musa vittata.

Musa zebrina.—Grown as an ornamental plant.

ALLIGATOR OR AVOCADO PEAR.

(*Persea gratissima*; *Laurus persea*, Linn.)

The "Aguacate" of the Spanish West Indies, the "Palto" of Brazil; often known as "midshipman's butter." This is a large tree of tropical America, known in Florida for many years. The first trees on the west coast were planted many years ago by Mr. Joseph Robles, of Tampa. These had attained large size, and were badly injured by the freeze of 1868. From that time until 1886 no serious injury from frost occurred to the large trees in Tampa, but in 1886 they were killed to the ground, large and small, without exception. Even trees of 30 or 35 feet in height with trunks a foot to 18 inches in diameter, were killed back.

On Point Pinellas the first seeds were planted by Captain Miranda, in 1866. From these four trees attained maturity, and were the parents of nearly all that were afterwards planted on the point.

They usually bore the fifth year from the seed, and when in full productiveness it is estimated that they will yield about five hundred fruits each. The trees which were bearing on the point in 1885 were sixteen or eighteen in number. Besides, there were many younger trees in various stages of growth and doing well. The freeze was not quite so fatal to these trees as to the mango. Very few, indeed, of them were uninjured, but with hardly an exception the trees which were bearing have sent up more or less vigorous shoots from the old roots, and it is hoped that some of them may have fruit in a year or two.

The fruit sold on the spot or in Tampa at from 75 cents to \$1 per dozen. None had yet been shipped.

The younger trees have many of them recovered and others have been planted. There are at present about 300 or 400 growing on the Point.

In the Manatee region there were one or two bearing trees and many more of large size about ready to bear. Nearly every one had a few small trees. All were killed to the ground, but sprouted from the roots vigorously in the spring.

Below Charlotte Harbor they were uninjured by the cold. Mr. Collier, at Marco, has probably the healthiest and best orchard of Avocado pears in the State. The trees are planted on high, rich, shell mounds, which soil agrees with them perfectly, as also does any high, rolling, rich location, especially when the yellow subsoil is found. Mr. Collier

markets his fruit at Key West and in Charlotte Harbor. On Key Largo there are many bearing orchards of young Avocado pears, but none are as healthy as those grown on a deeper soil. A tree is said to have attained a large size at Palatka previous to the freeze, while small trees were occasionally met with in other parts of middle and south Florida.

The fruits of the Avocado pear are very large, pear-shaped, of a brown or purple color, and in the common variety brown. They are of one or two pounds' weight. The pulp is of a greenish-yellow color, is from half an inch to an inch thick, and incloses a very large heart-shaped or round seed, the seed itself being often as large as a good-sized apple. The taste of the pulp is compared to that of beef marrow. It is eaten with salt and pepper, sometimes with the addition of butter or oil, sometimes with wine, and sometimes it is used as the basis of a salad, for which use it is steadily gaining in popularity in New York.

The fruit ships well, and is every year shipped from the West Indies to New York, where they retail at from 20 to 40 cents each. It is stated that while ten years ago there were not more than 100 fruits brought to New York in the course of a season, at present the sales of only one firm average from 300 to 500 fruits per week during the season, from June to November. It is said that an indelible ink can be prepared from the seeds which no known acid can remove.

The leaves of the Avocado pear are very large, somewhat resembling those of the Spanish chestnut, and very ornamental. The new growth is a rich wine-color. The seeds are very perishable, and if shipped any distance must be packed in dry sand.

The tree has been fruited in European hot-houses, and it is probable by means of glass only (without fire heat) it could be fruited in this way in many of the Southern States.

VARIETIES

Brown.—The commonest sort.

Purple.

GUAVA.

(*Psidium.*)

The guava has been styled the "Apple of Florida," and its presence was never more missed than last summer, after the disastrous freeze of 1886. Except the hardy varieties, Cattley and Chinese, nearly all the guava trees in the State above the Caloosahatchee were killed to the ground at that time.

The best authorities agree that tropical and subtropical America is the original home of most species of the guava. The fact remains, however, that the Cattley guava was first introduced into England from China in 1820, though it is possible that this species and Yellow Cattley or Chinese guava was first carried from Brazil to China be-

fore their introduction into European hot-houses. The Guinea guava, too, is said to be so named from the country of its nativity.

The common guava (*Psidium guayava*, Raddi; *P. pomiferum*, and *P. pyriferum*, Linn.), was first introduced into south Florida by Col. H. V. Snell (now of Gainesville, Fla.), in 1847. Colonel Snell brought the ripe fruits from Havana and planted the seeds at Sarasota. The original trees are still standing (or rather the roots, as the tops have been frosted down two or three times), near the residence of Mr. Whitaker, on Sarasota Bay. In 1848 Colonel Snell brought more fruit, the seeds from which were planted in the Gates grove, at Manatee village. These original roots, too, still exist. The guava of this species is now common all over south and middle Florida, in endless variety of flavor, size, shape, and vigor; pear-shaped, apple-shaped, large, small, pink, yellow, and white fleshed; with flavor like that of a strawberry to that of sawdust and vinegar; full of seeds, and almost entirely seedless. Indeed, there is a great field before us for the selection, improvement, and hybridization of the varieties of the guava. It is probable that the guava of the future will be as much superior to these varieties as the Bellflower or Carolina June is superior to a crab-apple. So far almost nothing has been done.

On Point Pinellas and at other places on Tampa Bay, on Charlotte Harbor, and more particularly at Manatee and Sarasota, the guava has become naturalized. The streets of Manatee village have a reputation as "guava thickets," and in the surrounding hammocks the trees are frequently met with. Guavas are plentifully cultivated in Orange, Sumter, Polk, and Lake counties, and in fact almost everywhere as far up as Jacksonville. At Fort Gatlin, near Orlando, there is a guava-jelly factory. The guava is also grown on the lower keys; but though never injured by frost, they are not so healthy as those grown on the sandy land of the main-land.

The leaves of the guava are evergreen, varying much in the different species and varieties. Of the common species the leaves are about the size and shape of a large apple leaf, are of a rather light green, thin, and roughish on the under side.

The foliage of the Cattley and Chinese guavas is much darker green, thick and shining like the leaves of a camellia, and at first sight not much resembling those of the common guava.

The flowers of the guava are white, handsome, and fragrant, and produced in the axils of the leaves.

The fruit, as before remarked, varies widely even in the same species, but in most cases is characterized by a peculiar aromatic or musky flavor not liked by the novice at first, but after a longer acquaintance with the fruit is not noticed. It is eaten and prepared in almost every conceivable way—raw from the tree; cut up with sugar, or sugar and cream; stewed, canned and preserved; made into pies, puddings, dumplings, and all the delightful compounds concocted by the good house-

keeper and appreciated by the "small boy," while the jelly and marmalade made from it are famous the world over.

The guava is free from insect enemies so far as we know.

At many places in south Florida the guava has heretofore never been thought worth cultivating for profit, but bushels of fruit have been allowed to waste. At Manatee, for years previous to the freeze, guavas were given away in any quantity to any one who chose to pick them up, while they were picked and sold at 25 cents per bushel. Hundreds of bushels went to waste every year for lack of some one to use them, and some seasons there were even more than the hogs could eat. They usually sold at 50 cents per bushel in Tampa, from 50 to 80 cents in Orlando, 50 cents per bushel was given in Fort Gatlin at the jelly factory, and \$1.50 and \$2 per bushel in Cedar Keys and Jacksonville.

The guava succeeds on almost any kind of land, is one of the most prolific fruits known, and its extensive culture could be made highly profitable in south Florida if only enterprise and capital could be attracted in that direction. Below Manatee it seldom freezes down, and when it does it invariably sprouts more vigorously than ever from the roots, and produces fruit again the second summer after. There were guava trees in Manatee 30 feet high previous to the freeze of 1886, and they had not been frozen down before in seventeen years. Owing to more heavy frost last winter the guava crop this summer is very light, there being no fruit at all except in favored localities naturally protected by bodies of water on the north or northwest. It is a strange fact, that while during the freeze of 1886 the thermometer sunk much lower in Orange County than on the west coast between Tampa and Charlotte Harbor, on the other hand, the frosts of last winter were much more severe along the west coast than in the lake region of Orange County; and it was even as cold at Ohuckaluskee Bay as at Orlando.

The jelly factory at Fort Gatlin is not running this summer, but if a mild winter follows it will doubtless be in operation next season. The guava fruits frequently in southern Texas and Louisiana.

SPECIES AND VARIETIES.

The following species and varieties of the guava are cultivated at present in Florida:

Common (Psidium guayava, Raddi).—This includes the White or Pear guava (*Psidium pyriferum*, Linn.), Red or Apple guava (*Psidium pomiferum*, Linn.).

Countless varieties and hybrids of these occur in Florida, many of the best of which will be named by the Florida Horticultural Society.

Saparaupur, Large Round, and Calcutta are recently-introduced varieties of this species.

Strawberry is a local name for a choice variety.

White winter guava.—Very distinct. Common in the Clearwater and

Dunedin district, Hillsborough County. Very large, 3 or 4 inches in length; pear-shaped; neck entirely free from seeds, and but very few contained in the thicker part of the pulp. Unsurpassed for canning, as the seeds can be removed like the core of an apple. Never ripens before November, and likely to prove very valuable on this account.

The nomenclature of the many distinct varieties of the species *P. guayava* has been taken up by some of the south Florida nurserymen, notably Mr. R. D. Hoyt, of Bay View, and it is probable that in a year or two the list of varieties of guavas will number one hundred or more, these, too, only the "cream" of the countless varieties more distinct than the named varieties of apples or oranges; distinct in color, shape, flavor, size, quality, and productiveness of fruit, in the foliage and many other details.

Guinea guava (Psidium Guiniense).—The foliage of this species resembles that of the common guava somewhat, but the leaves are broader and not so long. It has not yet fruited that we know of in Florida. It is said to be a native of Guinea, and produces quantities of fruit an inch in diameter, and of exquisite flavor.

Psidium aromaticum.

Psidium cujavillus.

Psidium araca.—A distinct and delicious guava, native of Brazil. Fruit very large, and seeds double the size of those of the common guava. Foliage distinct.

Cattley guava (Psidium Cattleyanum).—Also known as the Purple Guava. One of the most hardy species; uninjured by the freeze of 1886 as far north as Orange County. The common variety of this species is about an inch in diameter, of a fine claret-color, and with a flavor resembling that of a strawberry. In California this species is frequently called the "strawberry" guava. Likely to be held in better repute by those of the North, to whom the "musky" flavor of the ordinary guava is objectionable. As a jelly fruit too it is said to surpass the common guava. This species is grown in rows, like the currant, from 4 to 8 feet apart. Foliage thick and shining, resembling that of the camellia. It is being planted out to quite an extent at present. One gentleman near Orlando has recently set out three hundred plants. The crop of this species was fair last summer and very heavy this summer. Mr. E. H. Hart, who has grown the Cattley guava for many years, tells us that it can be much improved by selection of seeds even in a few years. *Adam's Purple guava* seems to be an improved variety of this species.

Yellow Cattley, Chinese or Commercial guava (Psidium Chinense).—Another valuable hardy species, producing yellow fruit of larger size, but much resembling the Cattley guava. Foliage almost identical with that of the Cattley. "Introduced many years ago by Mr. Bliss, who founded the colony at Aurantia."

The following species are native of Central and South America, and most of them yet remain to be introduced into Florida. Descriptions are from Von Müller:

Psidium acidum.—"Higher regions on the Amazon River. A tree at maturity 30 feet high; its fruit pale yellow and of apple size."

Psidium arboreum.—"Brazil; province of Rio de Janeiro. Fruit of about 1 inch in diameter, and of excellent flavor."

Psidium chrysophyllum (*Abbevillea chrysophylla*, Berg.).—"The Guabi-roba Do Mato of southern Brazil." The tree attains a height of 30 feet. Fruit, the size of a cherry.

Psidium cinereum.—"Brazil; provinces Minas Geraes and Sao Paulo.

Psidium cordatum.—"The Spiel guava; West Indies.

Psidium cuneatum.—"Brazil; province Minas Geraes; fruit greenish, of plum size.

Psidium grandifolium.—"Brazil; provinces Rio Grande do Sul, Paraná, Sao Paulo, Minas Geraes. A shrub of rather dwarf growth; berries, the size of a walnut.

Psidium incanescens.—"Brazil; from Minas Geraes to Rio Grande do Sul. Attains a height of 8 feet

Psidium lineatifolium.—"Mountains of Brazil. Berry 1 inch in diameter.

Psidium malnifolium (*Campomanesia malnifolia*).—"Uruguay. Berry 1 inch in diameter.

Psidium polycarpon.—"Trinidad; Guiana to Brazil. "A comparatively small shrub, bearing prolifically and almost continuously its yellow berries, which are of the size of a large cherry and of exquisite taste."

Psidium rufum.—"Brazil, in the province of Geraes, on subalpine heights. This guava bush gains finally a height of 10 feet, and is probably the hardiest of all the species producing palatable fruit."

GRANADILLA.

(*Passiflora edulis*.)

Granadilla is a name which seems to be applied almost indiscriminately to all the edible fruited species of the Passion vines. This species was originally a native of Brazil. The leaves are three-lobed and glossy, and the vine makes an extremely quick growth, often bearing fruit when two years old. The petals of the flower in this species are white; crown whitish, with a blue or violet base. The fruit is as large as a goose egg, of a purplish color, and contains a pulp filled with numerous small seeds; the pulp is jelly like, and of quite pleasant taste. The Granadilla is frequently met with in south Florida, having fruited freely in Orlando, Dunedin, and at other points. The freeze of January, 1886, seriously injured the plants, but in some cases they recovered so quickly as to produce fruit the same year, and this summer are fruiting freely. The Granadilla grows very fast, sometimes covering a space as

much as 15 feet square in its second year. It might be cultivated extensively in south Florida, as the vine will stand hard frosts unharmed.

The Large Granadilla (*Passiflora quadrangularis*) is a scarcer species than *P. edulis*, and is also a native of Brazil. It produced fruit as far north as Dunedin previous to the freeze, but nearly all of the large vines in the State were entirely killed at that time, as it is a much more tender plant than the former. The stems of the plant are four-sided, with wing-margined angles. The leaves are 4 to 8 inches long, ovate or slightly cordate, and bright green. The flowers are bell-shaped, fragrant, and about 3 inches long; in color they are crimson-purple, with the violet or blue crown variegated with white. The fruit is described as follows by Mr. Thomas P. Frank :

The fruit looks like a small oblong light-green water-melon, but when perfectly ripe assumes a yellowish color, and is usually about 5 inches in diameter by 8 long. Inside are the seeds, about the size of those in a cantaloup, and a large amount of very pleasant slightly-acid juice.

The plant is not yet cultivated in Florida to any great extent. The insect enemy of the Passion vines is a small yellow-and-black caterpillar, and all young plants need watching.

BARBADOES GOOSEBERRY.

(*Pereskia aculeata*.)

This is a climbing, or shrubby, cactus, with true leaves. It is quite frequently met with in cultivation in south Florida, where it is grown as an ornamental plant, or as a stock upon which to graft epiphyllums and other dwarf cacti. The berry-like fruits are edible, but the plant is not often cultivated for its fruit in Florida.

PEPINO (SYNONYMS, MELON SHRUB, OR MELON PEAR).

(*Solanum Guatemalense* ?.)

This edible-fruited *Solanum* was introduced into Florida and the Southern States two years ago from California, by one of whose nurserymen (the late Mr. Grelech, of Los Angeles) it was introduced from Guatemala. A more suitable name than "Melon shrub" is its native name, Pepino, as such names as the former often lead to confusion. Though introduced under the name *Solanum Guatemalense*, it seems to correspond almost exactly and is probably identical with *S. muricatum* and *L'Heritier*, of Peru. We give below the description of the original introducer, as it is probably a good description as it grows in California :

The Melon shrub, as it grows in the Central American high-lands, is, as the name defines it, a shrub. It reaches at its best 2 or 3 feet each way, but is generally smaller, and recalls in many respects the Chili pepper vine, the tomato, or the nightshade. The flowers resemble those of the Chili pepper, are very numerous and of a beautiful violet color, and are most charming when used in floral decorations. The

plants should be set in rows 4 feet apart and 2 feet in the rows. A month and a half after being set out the fruit will begin to set, and in three months after planting the fruit will ripen and continue to ripen until checked by frost. The fruit is of the size of a hen or goose egg, or even larger, and very much of the same shape. The color is lemon or pale orange with streaks or waves of bright violet, the whole making a fruit unrivaled in beauty. The interior of the fruit is a solid pulp similar to that of a pear, also of a pale-yellow color, and of a taste resembling that of a fine muskmelon, but which has besides a most charming acid, so wholesome and so delicious, that when the fruit is partaken of on a very warm day it allays the thirst for several hours. The plant is an enormous yielder. I have seen plants of small size, say 2 by 2 feet, bear 30 large fruits, which from their size and weight pressed the branches to the ground, and thus formed a most beautiful border all around the plant.

The Melon shrub can stand light frost, but heavy frost will cut it to the ground. The dead branches should then be cut off, the plants covered with an inch or so of straw, and it will, if so protected, start up in the spring as vigorously as before.

Having decided upon the merits of this plant and its fruit, and being satisfied that it will become a most welcome addition to the fruit not only of California but of all the Middle and Southern States of the Union, we decided to bring the same with us to California and try it here. After a good deal of trouble, and I must say no little expense and anxiety, we have now eminently succeeded. Our experience has been, we think, most valuable to us. The Melon shrub grows in California even better than in Central America, and the fruit is decidedly superior.

The cultivation of the Pepino in Florida has not produced such favorable results as were hoped for at first. The plants grow exceedingly well in the cool spring and fall weather, but if frosted down in winter they do not display the remarkably hardy traits claimed for them in California. This would scarcely be of great disadvantage, as young plants could be set out in the spring and would fruit the same year, other things being favorable. But in the warm rainy weather of our Florida summers the Pepino languishes, and at that time is very liable to the attacks of that sworn enemy of the Solanums, the leaf-roller. Then "eternal vigilance is the price of fruit," and sometimes of the life of the plant.

The Pepino requires well-drained land, and the new system of sub-irrigation is recommended by some as being beneficial, but in no case must the water be allowed to stand for any length of time around the roots of the plant. In a few cases complete success is reported with this fruit in Florida. Mr. J. H. Hurst, Lake Helen, Volusia County, has successfully fruited it, as has Maj. A. J. Adams, of Manatee, and others.

As a rule all *Solanums* like a cool though frostless temperature. In this respect they are much like the Cinchona. It seems to us that a thorough trial of the Pepino should be made (growing it as an annual) in the cool mountain region of western North Carolina and north Georgia.

The Pepino is usually seedless, and is propagated from cuttings, which strike easily. A supply could easily be wintered indoors, from which an abundant supply of cuttings could be taken in the spring, and the plants from these, with good care, would fruit in summer and fall.

TREE TOMATO OF JAMAICA.

(Solanum betaceum, Cyphomandra betacea.)

This plant is really a native of Central America instead of Jamaica. It is grown as far south as Buenos Ayres and Valparaiso, also in the Mediterranean region in Europe, for the sake of its tomato-like berries. The following description is condensed from that of Mr. D. Morris, now assistant director of Kew Gardens, London :

The plant is of shrubby habit, growing 5 or 6 feet high, with large shining leaves, often a foot long. The flowers are fragrant, of a pale flesh color, with yellow stamens, followed by fruit the shape and size of a hen's egg, at first of a purple tint, but gradually assuming a warm reddish color as it ripens. It answers in every respect the purposes for which the ordinary tomato is esteemed. The plants come into bearing in two years. "If the fruit is allowed to ripen on the plants it may be eaten raw, when it has a gooseberry-like flavor. If the skin is removed and the fruit (without the seeds) stewed with sugar, it resembles an apricot, but with a slight subacid flavor that is very refreshing."

In Florida the remarks applicable to the Pepino will apply pretty well to the Tree tomato. It is fruiting this summer, however, and doing exceedingly well for Mr. A. A. Marsh, of Orlando, Fla., and perhaps in other localities. Its value as a fruit plant for Florida is of course not yet well determined.*

HOG-PLUM, OR JEW PLUM OF THE WEST INDIES.

(Spondias dulcis.)

This species, or perhaps a closely-allied one, *Spondias lutea*, is highly prized as a fruit-tree in Key West and on the lower islands, and has produced fruit on the Manatee River.

The fruit is red, or with a yellowish tinge, and is of the size, shape, and taste of a plum. It is of a delicious subacid taste, in fact one of the best of West Indian fruits. The tree is deciduous, the fruit appearing along the branches in spring before the leaves come out. The fruit ripens in summer, from May to July; inside the pulp is a very large rough seed, which however seldom germinates; the tree being almost altogether propagated from cuttings. The Hog-plum is known as the "Mombin" in the French West Indies, and as the "Tapereiba" in Brazil. The tree is of quick growth, produces fruit when very young, and if frozen down sprouts up again readily from the roots. It will probably in time be cultivated extensively in south Florida, as it deserves.

TAMARIND.

(Tamarindus Indica.)

This handsome tree, a native of India, is grown almost universally throughout tropical countries at the present time. In the United States it is grown only in south Florida, and specimens are occasionally met with

* Specimens from Mr. Marsh sent to me were of a delicate purple color, and quite agreeable tomato flavor.—H. E. VAN DEMAN.

on the Gulf coast of Louisiana. In Key West it is the most common street tree, and it there reaches a very large size. It is also quite common on the keys and up along both the east and west coasts, having produced fruit as far north as Clearwater Harbor. Nearly all trees in the latitude of Manatee and Tampa were killed down—some entirely killed—by the “big freeze.” Previous to that time many had been bearing for years. One tree at Manatee when killed measured exactly 4 feet in circumference at the base. The tree has handsome pinnate acacia-like leaves, which, like most acacias and albizzias, etc., close at night. The flowers are small, of a pinkish-white color, followed by pods inclosing a pleasant acid pulp, much used, when preserved in sirup or sugar, as a basis of a cooling drink, and in medicine being rich in formic and butyric acid.

So far as we know the tree has no insect enemies, though sometimes the fruit becomes wormy and worthless late in the season. If care is taken not to break the shell-like pod inclosing the pulp tamarinds will stand any amount of shipment, and keep good from one to three months after picking. There is no reason why tamarinds might not be had in any and every market of the United States for many months during the year. They are ordinarily shelled, the pulp packed in casks, over which boiling sirup is poured until the cask is full, then, after cooling, the cask is headed up, and is then ready for shipment. There is but one variety known in America, with a comparatively short pod and acid pulp, though two other varieties are described as native in India.

TROPICAL ALMOND.

(*Terminalia catappa*.)

The tropical almond (or *Almendro* of the Cubans) is a common tree in Key West, and previous to the freeze good-sized specimens were growing up as far as Tampa Bay on the west coast, but these were at that time completely killed.

It is a magnificent tree, attaining a height of 60 or 70 feet, and with large oblong leaves, which at many seasons of the year are richly colored yellow and scarlet—“autumn leaves without frost.” The edible seeds ripen in July and August. The tree is described as follows by Charles Kingsley:

The tropical almond, with its flat stages of large smooth leaves, and oily eatable seeds in an almond-like husk, is not an almond at all or any kin thereto. It has been named, as so many West Indian plants have, after some known plant to which it bore a likeness, and introduced hither, and indeed to all shores from Cuba to Guiana, from the East Indies, through Arabia and tropical Africa, having begun its westward journey probably in the pocket of some Portuguese follower of Vasco de Gama.

The tree is not likely to become much cultivated in Florida except as an ornamental tree, and that not to a great extent, as it is more tender than many of the other tropical trees.

TRIPHASIA TRIFOLIATA.

This unique little shrub, of the Citrus tribe, is sometimes known as the "Bergamot" (but incorrectly), and the preserved berries are occasionally shipped from the West Indies as "lime berries." It is frequently used in Key West as a hedge plant, and fruits there freely. It was also occasionally seen in Tampa previous to the freeze. It is a thorny little shrub, with trifoliate dark-green leaves, but should not be confounded with *Limonia* (or *Citrus*) *trifoliata*, from which it is entirely distinct. It is a native of southern China, but is now said to be naturalized in India, and to some extent in the West Indies. The fruits are of the size and shape of gooseberries, with a reddish or wine-colored skin, each containing one seed. When fully ripe they have an agreeable sweet taste, and are sometimes preserved in sugar or sirup. It is of value principally as an ornamental plant, or hedge plant. It seems to be as hardy as the lime.

THE HOG-PLUM.

(*Ximenia Americana*.)

This small tree is a native of tropical America, Florida, northern Mexico, middle and south Africa, southern Asia, and north Australia. It is the "*Alvarillo del Campo*," of Mexico, the "*Amatunduluku*" of Natal. It is quite common in south Florida, but is not cultivated. It is mentioned with the idea of drawing attention to it as worthy of cultivation with a view to improvement. The fruits are about an inch long, of the shape of a plum, and when ripe the pulp surrounds a very large seed. The fruits are eaten generally wherever the tree grows, but no attempt seems to have been made to bring it into cultivation. The tree is not ordinarily injured much by frost south of Tampa Bay.

TROPICAL FRUITS RECENTLY INTRODUCED INTO FLORIDA—PROBABLY NOT YET FRUITING IN THE STATE AND BUT LITTLE KNOWN.

[We quote descriptions when practicable, and give occasional notes as to growth, etc.]

Antidesma Bunins, Spr.—"A native of Java and the neighboring islands, furnishes small, fleshy, berry-like fruits, of a bright-red color, ripening into black; they have a sub acid taste, and are used chiefly for preserving." (J. R. Jackson, curator museum Royal Gardens, Kew.)

This plant grows off exceedingly well, but its hardiness is not yet tested in Florida.

Antidesma ghoesembilla,.

Annona aurantiaca,.

A. Africana,.

A. amplexicaulis,.

A. Asiatica,.

A. cineria,.

A. hexapetala,.

A. longifolia,.

A. Mexicana,.

A. muscosa,.

A. macrocarpa,.

A. maritima,.

A. paludosa,.

A. palustris,.

A. piriformis,.

A. reticulata (the true Custard-apple, or Bullock's heart, of Central America and the West Indies).—This celebrated tree grows exceedingly well in south Florida, and will probably become as popular as the sugar-apple, to which it is preferred by many. It is not yet fruiting in Florida that we know of. The fruit is thus described by Mr. Thomas P. Frank :

The Custard-apple is not so likely to suit every one as the mango. To my taste it is unequalled by anything. When full the fruit will keep about three days before attaining its best flavor, when it should be as soft as a ripe Kaki. One of the largest and best I ate was so soft that the stem (which was from $\frac{1}{4}$ to 1 inch in diameter and reached half through) had pulled out in attempting to lift it. The fruits will average about 3 inches in diameter, nearly round, slightly conical. I had one $12\frac{1}{2}$ inches in circumference the smallest way, and saw one on the tree much larger. The outside is smooth, with slight depressions all over, such as a person's thumb would make in handling a chunk of putty, but close enough together to entirely cover the fruit. When ripe they are a dull yellow, with more or less brownish russet, though some are all yellow but with a pinkish red cheek, and are very handsome. Inside is a smooth soft substance about the consistency of good ice-cream ; about three-fourths of an inch next the skin is entirely free from seeds, pulp, or fiber ; this can be eaten off with a spoon, and dissolves in one's mouth about as readily as the above popular dish. The balance is milky white, and the seeds scattered through it are about one-fourth by one-half inch. There is some pulp to this part, but it adheres to the seeds, so does not interfere with the full enjoyment of eating. Although very sweet and without a trace of acid, the flavor is delicious, not at all sickish even at the first trial.

In Brazil the *Anona reticulata* is called "Fruta da Conde."

Anona suavisima.

Anona trilobata.

Anona — ? (the "Beriba" of Brazil).—A quick-growing *Anona*, "with large fruit, the inside of which tastes very much like the filling of cream cakes."

Adansonia digitata.—"The celebrated 'Baobab,' a native of the western coast of Africa, and also of Egypt. In the former country it is described by Adanson as being a tree of large dimensions and economy ; the trunk growing to the height of 12 or 14 feet, but of the vast circumference of 60 or 70 feet, the lateral branches growing to the length of some 40 or 50 feet, of the thickness of a great tree, their remote branches touching the ground, while some of the roots that had been laid bare were upwards of 100 feet long, and then they were not exposed their full length. The fruit is from 9 to 12 inches long, and about 4 in diameter, of a brownish color, and rather pointed towards the extremities. The pulp is a little farinaceous, mixed with fibers ; when fresh it has a very refreshing acid taste, and when eaten with sugar it is both pleasant and wholesome. It retains its cooling properties when dry, and on that account the physicians of Cairo administer it in fever and other diseases." (Rhind.)

The Baobab is also known as Monkey's Bread. It is a tender tree ; and not likely to prove of value above Charlotte Harbor. Maj. A. J. Adams, of Manatee, was among the first to introduce it to Florida several years ago.

Artocarpus incisa, *A. communis* (the Bread-fruit tree).—"That awkward-boughed tree, with huge green fruit, and deeply-cut leaves 1 foot or more across, leaves so grand that, as one of our party often suggested, their form ought to be introduced into architectural ornamentation, and to take the place of the Greek acanthus, which they surpass in beauty—that is of course a Bread-fruit tree." (Kingsley.)

"The Bread-fruit tree is the great gift of providence to the fairest isles of Polynesia. No fruit or forest tree in the north of Europe, with the exception of the oak or linden, is its equal in regularity of growth or comeliness of shape; it far surpasses the wild chestnut, which somewhat resembles it in appearance. Its large oblong leaves, frequently a foot and a half long, are deeply lobed, like those of the fig-tree, which they resemble not only in color and consistence, but also in exuding a milky juice when broken. About the time when the sun, advancing toward the Tropic of Capricorn, announces to the Tahitians that summer is approaching, it begins to produce new leaves and young fruits, which commence ripening in October, and may be plucked for about eight months in luxuriant succession. The fruit is about the size and shape of a new-born infant's head." (Hartwig.)

The tree also grows throughout the West Indies and southern Central America, where it attains immense proportions, the trunk often being from 10 to 12 feet in girth, and the branches reach out so as to cover a circumference of 100 or 150 feet. The fruit is prepared for eating by splitting it open, putting a small piece of fat salt pork in a natural cavity in the center of it for shortening and seasoning, and then baking it. The taste suggests something like a cross between bread and potato. The fruit of most varieties is seedless, and the tree propagated with difficulty from layers, except in the case of an old tree, which suckers from the root. According to Von Müeller, the fibrous bark can be beaten into a sort of rough cloth, the light wood used for canoes, and the gum issuing from cuts made into the stem, for closing the seams of canoes.

The Bread-fruit tree is very rarely seen in Florida; it is very tender, and though specimens have passed the winter safely as far north as Manatee in the open air in one or two cases, it is hardly likely to succeed north of the Caloosahatchee, unless as an ornamental tree with winter protection.

Artocarpus integrifolius.—The Jack or Jaca tree, is a little more hardy. There are but few specimens in the State. Mr. Bidwell, at Orlando, has a healthy young tree, which was killed back to the ground, however, by the freeze of 1886. The tree is a native of India, where it ascends to the elevation of 4,000 feet. For description, see Whitner's "Gardening in Florida."

Averrhoa carambola.—"Continental and Insular India. Not hurt by slight frost except when very young. Sir Joseph Hooker found this small tree on the Upper Indus as far as Lahore. The fruit occurs in a

sweet and acid variety ; the former is available for the table raw, the other for preserves." (Von Müeller.)

This fruit is also valued for making pickles. The leaves are compound and quite handsome.

Averrhoa Bilimbi (the Blimbing).—Closely related to the above fruit, and valued for the same purposes. The young plants are stronger growers than those of *A. carambola*.

Ægle marmelos.—The Elephant Apple, Maredoo or Bengal Quince of Continental India (Schleim), Appel-boom of the Dutch East Indies. A tree closely related to the Citrus, with tri-foliolate leaves, and a lemon-like manner of growth. Will stand light frosts.

Caryocar nuciferum.—The Souari-nut of South America.

Carica Candinamarcensis.—Resembles in foliage the ordinary native pawpaw of the north (*Carica papaya*).

Carica cauliflora.

Carissa acuminata.—Native of Natal and Zululand.

Deltonea lutea.—Native of Brazil, where it is called the "Capuassu." "It is a medium-sized tree, with immense thick foliage, so that in a grove of them it would be dark at noonday. The blossoms are small; the fruit an immense oval vessel, but often nearly round; a hard woody shell covered with a russet furze; inside, a yellow mass of pulp surrounding the immense seeds. When ripe, one of the fruits will most deliciously perfume the whole air. The flavor it is impossible to describe, but to drink the "wine of Capuassu," which is simply the pulp washed off in water and strained, with a little sugar added, is worth a voyage across the Atlantic." (Edward S. Rand.)

Eugenia Australis.

Eugenia Brasiliensis.

Eugenia pimenta (the Allspice tree).—Grows well, and blossomed at Manatee previous to the freeze.

Eugenia Willdenovii.

Eugenia zeylanica.

Eugenia uniflora.—Brazil. Fruit of cherry size. Will probably prove hardy.

Feronia elephantum.—A fruit of considerable note; a native of northern and central India.

Garcinia pictoria.—A near relative of the famous mangosteen. Leaves very large and thick. New growth light wine-color.

Glycosmis pentaphylla.—Native of India.

Guilielma speciosa.—The "Peach palm" of the Amazon, known to the Indians as the "Pirijao." It is described as follows by Wallace in his "Palms of the Amazon":

This most picturesque and elegant palm has the stem slender, cylindrical, and thickly set with long needle-shaped spines disposed in rings or bands. It reaches 60 feet in height and grows quite erect, though in exposed situations it becomes curved and waving. The leaves are very numerous, terminal, pinnate, and drooping, forming a neat spherical crown above the stem; and the leaflets growing out of the midrib

in various directions, and being themselves curled and waved, give the whole mass of foliage a singularly plummy appearance. The fruit is the size of an apricot, of a triangular oval shape, and fine reddish-yellow color. In most instances the seed is abortive, the whole fruit being a farinaceous mass.

The fruits are said to be eaten either boiled or roasted, and have a flavor combining that of roasted Spanish chestnut and sweet-potato. They are also said to be ground up into flour and made into cakes, which are roasted like cassava bread ; or the meal is fermented in water, and forms a subacid creamy liquid. The fruit is said to stand twenty to thirty days of transportation when ripe.

Lucuma cainito.—The “Abio” of Brazil. “The fruit is of a clear orange-yellow, with a smooth skin like a nectarine, and one of the best fruits we have here in Brazil. It is also a very handsome ornamental tree. In size the fruit varies from that of a large plum to that of an apple, and I have seen it in eastern Peru as big as a small melon.”—(Edward S. Rand.)

Mimusops Elengi.

Myrtus ugin (Chilian myrtle).—“Has long been valued in its native country for the sake of its fruits, which are of brownish-red color when ripe, and about the size of a large black currant. It has a soft juicy pulp, with a sweetish and somewhat aromatic flavor. It is described as being cultivated in gardens and used as dessert in Valparaiso, and the expressed juice of the fruit mixed with water is said to form a very refreshing drink, having an odor of rosemary.” (John R. Jackson)

Perhaps more suitably classed as semi-tropical, as it will doubtless prove hardy in Florida.

Nephelium litchi (the Litchi or Leechee).—“A small insignificant tree, with lanceolate leaves and small greenish-white flowers, is a native of China and Cochin-China, but its cultivation has extended over the East and West Indies. The plum-like scarlet fruit is generally eaten by the Chinese with their tea, but it is also dried in ovens and exported. In order to obtain the fruit in perfection for the use of the imperial court, the trees, as soon as they blossom, are conveyed from Canton to Peking on rafts at a very great trouble and expense, so that the plum may just be ripe on their arrival in the northern capital.” (Hartwig.)

“In this country we know the Litchi only in its dried state, that is, when the outer warted shells have become woody, and the inner pulp, or aril which envelopes the seed, has somewhat shriveled and become black. In this state the pulp has simply a sweet taste, but in the fresh state the pulp is whitish, or slightly tinged with pink, and has a refreshing acid taste. A sample of these fruits with the woody coat removed, showing the inner pulp preserved in fluid, from Siam, is shown in the Kew museum, and they suggest the possibility that this pulpy portion might be preserved in tins in a similar manner to pine-apples and sent to this country.” (John R. Jackson, Kew Gardens, London.)

The Litchi tree is evergreen, and the fruit seems to be highly esteemed by Europeans living in India and China; by some it is said to be “as

delicious, perhaps, as any fruit in existence." The pulp is transparent, in some varieties resembling the white of an egg. The Litchi was introduced to Florida last year by Mr. Wheatley, of Orange County.

Passiflora macrocarpa.—Native of Brazil and Peru. A commonly-cultivated "Granadilla" in Jamaica. Specimens of the fruit have been known to attain a weight of 8 pounds.

Passiflora maliformis (the Sweet-cup or Sweet calabash).—"It has a thick triangular stem, with leaves oblong, cordate, 6 inches long and 4 inches broad, and in the middle a lively green. The flowers are sweet-scented, large, of a pale red and blue; the fruit round, smooth, about 2 inches in diameter, of a dingy yellow color when ripe; the coat is hard and stringy, nearly a quarter of an inch in thickness, full of a very agreeable gelatinous pale yellow pulp, in which many oblong black seeds are lodged." (Loudon.)

The Sweet-cup is a native of the West Indies, and was introduced to Florida by Colonel Codrington, of De Land.

Platonia insignis.—"Known here as 'Bacury,' and is a very popular fruit. The tree is large, with broad dark-green foliage and large rose-colored blossoms. The fruit has a hard, smooth, bright-yellow shell; is as big as a very small cocoa-nut, and contains a few large seeds embedded in a semi-acid pulp of delicious flavor. The choicest and most expensive preserve in this part of Brazil is made from this fruit." (Edward S. Rand.)

Platonia species.—"Bacuri-miri" of Brazil.

Pachira aquatica (*Carolinca princeps*).—The "Provision tree" of British Honduras and other parts of Central America. The fruit of this tree is said to be round, about the size of a child's head, and containing numerous chestnut-like seeds, sometimes eaten by the natives during times of scarcity.

Phyllanthus emblica.—"Known as the Emblic Myrobalum. A tree of the dry forests of India and Burmah. The fruit is about the size of a small damson. The natives eat it raw, preserved, or made into sweetmeat, while it is used by Europeans for tarts and jellies. It is stated that a 'half-ripe fruit, if chewed, has the effect of making water taste sweet.'" (John R. Jackson.)

Phyllanthus emblica grows remarkably well in Florida; it is a beautiful tree, and not so tender but that in time it will be in common cultivation in south Florida.

Solanum pubescens.

Solanum Capense.

Spondias amara.

Spondias Cytheria (the Otaheite plum).—Commonly cultivated in the Sandwich Islands. Fruit a golden-yellow color, in size and shape somewhat resembling the Loquat, but said to surpass it in flavor. Flavor described as "aromatic, with a suggestion of strawberry and pineapple."

Vangueria edulis.—The “Voa-vanga” of Madagascar. Described as producing delicious berries three-fourths of an inch in diameter. Introduced to Florida by Mr. Bidwell, of Orlando. Grows exceedingly well, and sprouts from the root readily when frozen down.

TROPICAL ECONOMIC PLANTS NOT STRICTLY CLASSED AS FRUIT PLANTS.

The following are occasionally cultivated in extreme south Florida:

Coffea Arabica (the Arabian Coffee plant).—The Coffee plant was first fruited in the United States in the open air by Mrs. Julia Atzeroth, on the south side of the Manatee River, seven or eight years ago. Some time after, the Department of Agriculture at Washington being in want of fresh seeds, Mrs. Atzeroth sent them the first pound of coffee produced in the United States, for which she received \$10, not as a “premium,” as has been stated, but as the price of the seed.

At the time of the freeze of 1886 the original shrubs had attained a height of 10 or 12 feet, and were bearing profusely every year. They were killed to the ground, but sent up strong shoots from the roots in the spring, which were not injured last winter, and are now 3 or 4 feet in height.

Other plants were fruiting in various parts of south Florida, and many small plants had been set out, but unless of large size they were generally killed outright, except in the extreme southern part of the peninsula. It is probable that the culture of coffee could be made profitable on the extreme southern part of the main-land and on the lower range of keys, but unless artificial shelters are constructed the plant is too tender for extensive culture north of the Caloosahatchee.

The coffee shrub is evergreen, with dark-green glossy leaves, somewhat resembling those of the chestnut, though much smaller. The flowers are small and white, followed by red berries resembling cherries, each containing one rounded seed, or two seeds flattened on the sides facing each other. The pulp surrounding the seeds is valueless.

Coffee is said to be superior, and more freely produced, when grown under partial shade of some kind. Bananas or plantains are used for this purpose in many coffee-producing countries.

The principal enemies of the coffee plant are the “Coffee-leaf fungus” (*Hemileia vastatrix*) and the Cemiostoma fly. The destruction of the Coffee-leaf fungus is said to be effected by applying flour of sulphur when the dew is on and by dressing the ground with quick-lime.

The different brands of coffee, Java, Mocha, Rio, etc., are all produced from the same species, grown in different soils and climates, and effected somewhat by different modes of curing.

Coffea Liberica (the Liberian coffee).—This coffee grows to the size of a real tree, is a rich bearer, and produces larger berries than the Arabian coffee plant, but the fruit requires a longer time to ripen—about one year. It is said to be exempt from the attacks of the Cemiostoma fly, and to be less affected by the Coffee-leaf fungus. It is steadily

growing in favor in Guatemala, Jamaica, and other coffee-producing countries. But recently introduced into Florida. Its hardness not yet tested, but it is likely to prove very tender as regards cold weather.

Coffea Bengalensis (Bengal coffee).—But recently introduced.

Cola acuminata (the Kola nut).—Introduced by Colonel Codrington, of De Land. Very tender, and not likely to succeed much above Charlotte Harbor. We quote Mr. Morris's description:

Locally the nuts are used as a stomachic and a tonic. They are said to have effected remarkable cures in dyspepsia and allied disorders, and are used for this purpose in the same manner as cacao or chocolate. It is prepared by grinding the dry cured nut into a powder, and mixing with boiling water, sugar, and milk. Some people use Kola nut regularly at breakfast in this manner, and consider it superior to everything else of the kind. To cure the nuts for export they only require to be taken out of the pods and subjected to careful drying in the sun until quite firm and hard. The process, however, is required to be thoroughly done, owing to the thickness of the cotyledons, and to prevent moldiness on the voyage.

Crescentia cujete (the Calabash tree).—The Calabash tree is native of tropical America as far up as Cuba, one species, *Crescentia cucurbitina*, being occasionally found on the extreme lower keys in a wild state. *Crescentia cujete* is the species commonly cultivated. The fruit hangs directly from the branches and trunk of the tree. The pulp is not edible, but the large shell is used for dippers, bowls, and drinking and culinary vessels of all kinds. The tree is very tender, but when grown from cuttings usually sprouts up from the roots if the tree is frosted back. The tree is rarely seen in Florida, but there are a few trees in Key West and in other parts of south Florida, and more might be grown anywhere in the lower part of the peninsula.

Piper nigrum (Black Pepper).—The black-pepper vine was introduced a number of years ago by Mr. Bidwell, but we do not know that any success in its cultivation has been yet reported. It is a native of the forests of Malabar and Travancore, in southern India. Full directions for its cultivation are given in Simmond's "Tropical Agriculture." It is possible that its culture might be made profitable on the lower keys.

Piper futokadsura (Japanese Black Pepper).—Has been introduced, but not much tested.

Theobroma cacao (the famous Chocolate tree).—Was introduced a few years ago, but is very rare in Florida. Might perhaps be cultivated in the extreme south, where coffee can be grown. A species of Erythrine is usually employed to shelter the young plants (called Madre de cacao), or in some localities the banana or plantain are used for that purpose.

Vanilla planifolia.—The orchid producing the true Vanilla bean of commerce was found a few years ago growing wild at Whitewater Bay, near Cape Sable, by Prof. A. H. Curtiss. It is quite probable that in this region its culture could be made profitable. It is grown from cuttings, which are planted at the foot of trees, on which the orchid climbs.

Vanilla aromatica is closely related.

SEMI-TROPICAL FRUITS.

ORANGE.

Citrus aurantium.

The orange is at present, of course, one of the most important, if not *the* most important, fruit of the lower South. It is cultivated for profit, with more or less success, along the Gulf and Atlantic coasts, from the Rio Grande to the sea islands of South Carolina. Louisiana and Florida are the only States that have raised more than enough for home consumption.

The great freeze of January, 1886, was perhaps the hardest shock to the orange industry ever experienced in the Gulf States, though it was undoubtedly a means of good in checking reckless extravagance and speculation so common in parts of the South, especially in Florida. The day is past when orange culture was regarded as only an easy and agreeable way to make an immense fortune, and Florida a modern El Dorado, where "golden apples" grew on every bush.

The bubble of past years has burst, the schemes of unprincipled land agents have been laid bare, the freeze has helped to restore people to their senses, and Florida stands to-day ready to compete with the great orange-growing countries of the world in the sharp struggle for a supremacy based on actual merit. The man who comes to Florida to-day with the idea of making himself a successful orange-grower must be, in the first place, a true pomologist, in love with his work and everything pertaining to it; and prepared to spend years of hard work, money, brains, and the concentrated efforts of a life-time, in order to attain his end. There are probably hundreds more to come yet with the old idea that a few acres of land—trees to set on it—an interval of three or four years—a fortune. That thousands have already come to Florida with this illusion in mind and been disappointed is owing to the extravagant "yarns" of unprincipled land agents and owners—a class of people despised by the true friend of Florida as of much more harm than good.

Orange culture should be placed on a level with any honest legitimate business, fitted for those who love horticultural pursuits. The man whose decided preference would be to carry on a stock farm in the West or a grocery store in New York, but who tries orange-growing as an easy way to a fortune, will be disappointed. One must understand and like the soil, climate, and business; and not be afraid of hard work, "hard-pan," or "hard-tack"; discouragements by insects, freezes, "dropped" and "split" oranges, "rust," poverty of the soil, and the wiles of commission merchants, to be successful.

By the freeze of 1886 the orange trees of every part of the South except those below middle Florida (the lake region of Sumter, Orange,

and Lake counties), suffered severely. In Louisiana they were in most cases killed to the ground, and no crop of any amount can be expected for several years. This was also the case in parts of southern Texas, Mississippi, and Alabama, in extreme north Florida, and along the coast of Georgia and South Carolina, where a few trees were occasionally grown.

In the neighborhood of Palatka, Putnam County, Fla., the old trees lost their leaves and 2 or 3 feet of wood on the ends of the branches, and yet many groves bore full crops last season, though that was the exception rather than the rule. In Orange, Lake, Sumter, and Hernando counties many of the trees lost their leaves, but were little damaged otherwise. Below Tampa no serious damage was done, though it was thought by some that the shock of the freeze was influential in preventing a good summer's growth on the trees. There is no doubt but that had the weather after the freeze suddenly turned warm and sunny, the damage would have been immensely worse, perhaps resulting in the loss of most of the bearing trees in the State; but the cold cloudy weather following was especially favorable, giving everything a chance to "thaw out" gradually.

Last winter (1886-'87), though unusually severe, did not result in any serious damage to bearing trees in this State.

The crop of oranges last year for the Gulf States, except a very little in Louisiana, was confined to Florida. It, too, was unusually light, and high hopes were raised that unusually high prices would be realized. In some cases these resulted in partial or complete disappointment, owing to the glaring defects in the system of marketing, the crowding of the great markets to the almost entire exclusion of the smaller ones during the month of December, the excessively high rates charged by railroads and other transportation companies, and other causes, perhaps the most obvious of which is the shipment of such immense quantities of inferior fruit. The aim of Florida orange-growers should be to grow and market no oranges except the very best, highest flavored, and most attractive fruit, put up in the neatest possible manner. (In connection with this subject a most valuable address was delivered before the Farmers' Institute at De Funick, March 8, 1887, by Mr. A. H. Manville, which appeared afterwards in the columns of the Florida Dispatch for March 14, 1887.)

The crop marketed from Florida during last season (1886-'87) reached the amount of over 1,000,000 boxes.

Perhaps a fair idea will be given of the prices realized by giving the figures relative to the crop of Col. C. H. Foster's "Fair Oaks" grove, at Manatee, which may be taken as a fair sample of a seedling grove on hammock land. This grove is situated on first-class hammock land; the entire grove consists of 4,000 trees, but only 1,500 of these are bearing, excepting now and then one of the younger trees. Of these 1,500 trees, 700 have been set out in grove form sixteen years, 400 have been out eleven years, and 400 only seven to ten years. From these trees

were shipped last year 4,724 boxes, which sold (with freight deducted) for \$7,168.96. This gives an average of about \$1.50 per box. When it is known that four car-loads of these were literally thrown away during the "glut," it will be seen that the average for the balance is good. The trees are all of the best quality of seedlings.

Deducting the entire expenses during the year, for care of grove, fertilizers, hired help for picking, sorting, packing, plowing, pruning, horse-feed, overseer's salary, taxes, and all incidental expenses, leaves a balance of \$3,463.95 net proceeds for one year.

Two years ago, from 200 trees in this same grove, which had then been set out but five years, 80,000 oranges were picked. There is but little doubt that a budded grove of the best varieties, of the same size and age as this, on the same kind of land, but more highly fertilized (Colonel Foster's grove has been fertilized but very little), could be made to bring in twice this amount of money in the same season.

The crop of oranges this year, it is estimated, will be much lighter than that of last year, considering the increased number of trees that have come into bearing. The spring bloom was very light all over the State. Hopes were then entertained of a crop of June blossoms, but these hopes, in many parts of the State, were not realized, probably on account of our unusual seasons.

It is probable that had we had our customary drought in April and May, at the beginning of the rainy season, in June, most of the orange trees would have blossomed freely; but instead of our usual weather there was a severe drought in February and March, which probably had its effect in causing the trees to bloom but little then; then from the first of April copious rains fell until they were merged into the usual showers of the "rainy season," and there was no check in the growth of the trees such as usually occurs in May, to be renewed again by the copious showers of June.

Still there was a moderate crop of June and July blossoms in the lake region from Leesburgh to Orlando, and occasionally in other localities. Near Orlando there is considerable of a June crop, especially on the budded trees, which in all cases have held their fruit better than the seedlings. It is estimated that there will be two-thirds of a crop in this region.

At Manatee, which last year shipped 13,083 boxes and 301 barrels of oranges, there will not be one-fourth of a crop. It is estimated that there will not be over 1,000 boxes on the Foster grove, which last year produced 4,724 boxes, besides uncounted numbers of "drops."

Taken altogether, those familiar with the crop prospects all over the State tell us that not over 1,000,000 boxes may be expected from Florida this year, while a full crop for this year would have been over 3,000,000 boxes.

The acreage in orange trees is increasing very fast. It is impossible to estimate the number of trees set out each year, or to make any satis-

factory guess at it. But comparatively a small amount of the choicest hammock lands remain yet uncleared, though there are many thousands of acres of high pine land suited to the orange and lemon yet in a state of nature all over south Florida. There are several groves in the State of one or two hundred (or more) acres in extent. Among the largest of the older groves are the Bishop and the Harris groves, at Citra; older and more famous, though smaller groves, are those of Colonel Hart, opposite Palatka; of Colonel Magruder, at Rockledge, Indian River; and the Spear grove, near Titusville.

The Stebbins grove, at Orlando, is a fine young grove of 160 acres just coming into bearing. Parties in Hernando County, it is said, are planting out a 1,000-acre grove.

The best example in the State of an orange grove on low hammock land is the fine grove of Mr. E. H. Hart, at Federal Point. This grove is of the choicest budded varieties; the land is "bedded up" by means of numerous ditches. The large grove of General Sanford, at "Belair," near Sanford, consists of 125 acres; it is planted on high pine land. General Sanford has been the means of introducing into the State many of the choicest varieties of the orange and lemon from the Mediterranean region.

About the first nursery of orange trees in the State was planted out by Mr. S. B. Parsons, the well-known horticulturist of Flushing, Long Island, on the Saint John's River, in 1869. Among the pioneer nursery-men who lived in the State the names of Lucius Hardee, Albert I. Bidwell, and A. J. Beach are conspicuous. There are now forty or fifty first-class nurseries in the State.

The prices of budded orange and lemon trees in the State are about as follows:

	Per 100.
Diameter of stock— $\frac{3}{8}$ to $\frac{1}{2}$ inches, one-year buds	\$40
$\frac{1}{2}$ to $1\frac{1}{4}$ inches, one-year buds	50
$1\frac{1}{4}$ to $1\frac{1}{2}$ inches, one-year buds	60
$1\frac{1}{2}$ to $1\frac{3}{4}$ inches, one-year buds	75

About 10 per cent. is deducted when 1,000 or more trees are sold, and trees of the *Citrus nobilis* varieties are held at somewhat higher prices.

The insect enemies of the orange tree are very numerous; their number is said to be something over fifty. The most important of these, at least the one that has caused the most damage, is the common scale-insect. Many effective remedies are given for the scale, but none will be needed if the trees are kept in a good healthy condition. The rusty oranges (called "Russetts" in northern markets) are said to be so disfigured by the rust-mite, a microscopical insect.

The insect enemies and friends of the orange have been enumerated and described in a valuable work on orange insects by William H. Ashmead, also in a work by Dr. C. J. Kenworthy (these may be had of the Jacksonville news-dealers); they are also most exhaustively described in the excellent reports of Prof. C. V. Riley and Prof. J. H.

Comstock, which have appeared in the reports of the United States Department of Agriculture since 1878.

These, together with practical treatment for their destruction, as well as the enumeration, causes, and cures of the various diseases of the orange tree are fully discussed in the following works on orange culture by some of the best and most practical writers in the State :

Orange Culture, by A. H. Manville ; Handbook on Orange Culture, by T. W. Moore ; Treatise on the Culture of the Orange, by George W. Davis, M. D. ; Florida Fruits and How to Raise Them, by Helen Harcourt. Any of these may be purchased of the Jacksonville news-dealers.

Much valuable information on orange culture can also be found in the columns of the three leading agricultural papers in the State—the Florida Dispatch, edited by A. H. Manville, Jacksonville, Fla. ; the Florida Farmer and Fruit-Grower, edited by Prof. A. H. Curtiss, Jacksonville, Fla. ; and the Florida Agriculturalist, edited by E. O. Painter, De Land, Fla. The last-mentioned paper published a few years ago a complete translation of Gallesio's celebrated work on orange culture.

VARIETIES.

The following list of varieties now growing in the State we have endeavored to make as complete as possible up to date, but as new oranges are constantly being introduced, both by importation and the production of new native varieties, it is difficult to catalogue them completely. We are indebted to some of the above-mentioned works on orange-culture, and to the leading nursery catalogues of the State, for most of the descriptions. We have endeavored to give synonyms when possible to determine that such varieties are really synonymous, but in cases where there is dispute as to identity, as in the Navel class, each variety is given separately. Many have not been introduced into Florida long enough to determine their value or their identity.

I.—CITRUS AURANTIUM DULCIS.

Acis.—"A very thrifty strong-growing tree of wide-spreading form ; fruit late in ripening, large size and of good quality." (Aaron Warr.)

"Large, roundish, ovate. Quality good. Tree strong-growing. Imported." (Manville.)

Acapulco.—"Recently from California. Said to be large and fine." (Manville.)

Africana.

Arcadia.—"Size large ; form somewhat flattened ; color deep ; eyes set in slight depression ; stalk inserted in a slight roughened cavity ; skin smooth with marked pits ; thickness of skin $\frac{3}{8}$ inch ; longitudinal diameter, $2\frac{3}{4}$ inches ; transverse diameter, $3\frac{1}{4}$ inches ; color of flesh, deep ; grain coarse ; pulp melting ; juice slightly subacid ; quality good. Supposed seedling raised at Arcadia, and introduced by the Rev. William Watkin Hicks." (Moore.)

Beach's No. 1 (syn. *Egg*).—"The earliest grown, medium size; very sweet; rich high flavor; ripens from September 15th to October 1st. Shape, nearly round; fine shipping qualities; color very dark orange." (A. J. Beach.)

"A subvariety of early oblong, which it resembles, excepting that the fruit is smaller, having a smoother skin and being more juicy." (Manville.)

Beach's No. 2.—"Above medium size, inclined to pear-shape; qualities for eating will compare with No. 1; ripens November 1. Color, dark orange; fine tough rind for shipping." (A. J. Beach.)

Beach's No. 3.—"Has a peculiar and tender pulp, very rich, slightly acid when ripe; is a great favorite with many; size about medium; shape flat from stem to blossom end; color light orange; ripens December 1st; will bear shipping finely." (A. J. Beach.)

"Size above medium; form oblong; color light; eye set in flattened surface; stem inserted in a slight wrinkled cavity; thickness of skin $\frac{3}{16}$ inch; longitudinal diameter, $3\frac{3}{4}$; transverse, $3\frac{1}{4}$ inches; pulp coarse, not melting; juice subacid; quality fair." (Moore.)

Beach's No. 4 (synonyms, *Buenã Vista*, *Old Vini*).—"Is one of the best late ripening; large in size, often weighing 1 pound; shape round; subacid when ripe; a beautiful leathery rind; will keep longer than any apple in the country." (A. J. Beach.)

"Size about medium; slightly flattened; color, dark orange; eye broad and set in a slight cavity; stem inserted in a narrow wrinkled depression; surface of skin rough; thickness of skin $\frac{3}{16}$ inch; longitudinal diameter, $2\frac{3}{4}$ inches; transverse, $3\frac{1}{4}$ inches; grain coarse; pulp melting; juice subacid, and remarkable for a slightly vinous property; quality good. Seedling raised by Colonel Dancy, Buena Vista, Saint John's County, Fla. (Moore.)

Beach's No. 5.—"Large, pear-shaped, very sweet, and of good flavor; color dark orange; ripens in February; very prolific; makes a full crop every year; will carry the fruit perfect through blooming season." (A. J. Beach.)

Bell.—"Large, pear or bell shaped; skin firm; juicy. Tree prolific, a strong grower, having fewer thorns than some varieties. Probably imported, but long grown in Florida. (Manville.)

Botelha.—"Imported; said to be superior, with thin rind and rich pulp. Apparently differs little from native varieties." (Manville.)

Brazilian.—"Large; round or oblong; of fine quality; an immense grower and bearer. Imported." (G. H. Norton.)

Canton hybrid.—A newly-imported Japanese orange.

Catania.

Centennial.—"This variety, introduced by E. H. Hart, has not been thoroughly tested, but it promises well. It was awarded first premium at the State fair in 1885. It ripens early and hangs on the tree late, and as the quality is fine, it may prove to be one of our very best varieties." (A. L. Duncan.)

Chilensis dulcis.

Circassian.

Charley Brown.—"Native variety; strong grower; fruit much flattened at ends; good quality." (Kedney.)

China Sweet.—"Comparatively new. The fruit of medium size, rind thin, tender, juicy, sweet, and delicious. This has taken the first prize at the State fair for three years." (A. L. Duncan.)

Chuchupilas.

Cunningham.—Originated in Sumter County, Fla. Scored 99 points at New Orleans Exposition.

Creole.—"Large, round, firm skin, juicy. Quality good, tree prolific, vigorous, somewhat thorny." (Manville.)

Dancy's Best.

De Bary's Best.

Dixon.—"Fine large orange, first-class, good shipper. Native seedling." (Manville.)

Dr. May's Best.

Double Imperial.—Discovered in Louisiana by Maj. A. W. Rountree, of New Orleans, and buds were sent by him to Florida. It has the peculiar "navel" mark, and is of excellent quality. (Van Deman.)

Dulcis Sanguinea de Colmar (Sweet Blood of Colmar).—Recently introduced. "Rather small, but of good quality. The flesh shows but little red." (Van Deman.)

Dulcis Vanilla.

Dummitt.—"Large, bright, juicy, sweet, sugary; a first-class orange, except the skin is thin and tender, which renders it difficult to ship." (Manville.)

Dulcissima (syn. *Dulcis*).—"Small, very sweet, generally seedless; prolific. Well known in Paris." (Manville.)

Du Roi.—"Size medium, round; skin firm; juicy. Quality best. Plainly marked, being ribbed like a musk-melon. A good shipper. Tree very prolific, vigorous; few thorns. We have fruited this variety for a number of years, and can recommend it as unequalled in quality; its distinctive mark adds greatly to its value as a market fruit." (Manville.)

Early Spanish.—Early. "Fruit rich and well-flavored, a good shipper, strong grower, and ripens its fruit in October." (Kedney.)

Early Oblong (syn. *Thornless Bell*).—"Fruit medium size; oblong; skin thick; lacking the subacid of other sorts. Quality fair. Although its color turns little if any earlier than other sorts, its juices attain perfection in September and October, when it should be artificially ripened and marketed. Tree bears young; prolific; vigorous; not as large as some; leaves elliptical, acute, and scattering; branches slender and thornless. It is easily distinguished by the appearance of fruit and foliage. This is far from being all that could be desired as an early fruit, but is the only early sort that has thus far been brought to public notice." (Manville.)

Enterprise Seedless.—Good early variety, almost thornless.

Emperor of China.

Egg Nutmeg.

Everbearing (Pelton's).—Described as a first-class orange, producing several crops in a season.

Excelsior.—"Medium-sized, round, sweet, delicious, slight pine-apple flavor; quality good. Tree vigorous, few thorns, imported." (Manville.)

Exquisite.—Size below medium, fruit thin-rinded, rich and juicy. A. good grower. Imported by General Sanford.

Floral (Mann's).—A thin-skinned juicy fruit of small size, high flavor, and remarkable sweetness; tree said to be of vigorous habit and nearly thornless; fruit said to mature very early in the season, being quite palatable in October. Originated in the grove of Senator A. S. Mann, of Floral City. Named at the Orlando exposition, in February, 1887, by the committee on citrus fruits.

Foster.—One of the best early oranges in the State. Can be eaten in August, is good in September, and in October, November, and December is unsurpassed by any orange unless it be the Washington Navel. Original tree, from Havana seed, planted over forty years ago, now in the grove of Col. C. H. Foster, of Manatee. Orange perfect in size (according to the scale of the citrus committee at Orlando, which adopted 2 $\frac{3}{4}$ inches as the standard of perfection, 176 to the box, unsurpassed in smoothness and brightness of skin and in flavor.*

Gates.—Another superior sort, resembling the Foster, ripening early. Originally from Havana seed.

Hart's Late† (syn. *Hart's Tardive*).—Probably identical with the "Brown" orange. Imported from Thomas Rivers, by S. B. Parsons, Flushing, L. I., who gave it to E. H. Hart.

"Medium-sized, round; skin smooth and thin; grain fine, with a brisk and racy flavor. Does not mature until late in the spring and retains its juices until the middle of July, or even later, and is especially valuable on this account; quality good. Tree prolific, a strong grower; branches thornless or nearly so; foliage somewhat distinct. This is the only late sort which has been thoroughly tested in this State. We have fruited it for some years, and can highly recommend it. It can be marketed from March to July, when oranges command high prices, and is a valuable acquisition for locations and latitudes where the fruit is not liable to be frozen on the trees in winter." (Manville.)

Heong Leong.

Halifax River Seedling (Anderson's).—A fine native sort, originated at Ormond, Volusia County.

* Specimens examined here at the Department of Agriculture this fall were of excellent quality. (H. E. VAN DEMAN.)

† Specimens from Mr. Hart received fresh from the trees this year on June 13, were only just ripe and in prime condition. The quality was excellent. (H. E. VAN DEMAN.).

Higgins.—"Medium, fair; skin smooth and thin; pulp fine, juicy, sweet, and excellent. Native seedling." (Manville.)

Havana Sweet.

Homosassa.—"Size about medium, somewhat flattened; very heavy; color bright; skin remarkable for its toughness and density, and thinner than that of any variety thus far examined; eye dark, varying from one-eighth to two-eighths of an inch in diameter, and set in a flattened surface about three-quarters of an inch in diameter; pulp very fine, and remarkably juicy and sweet; flavor full, vinous, and sprightly; membrane covering segments of pulp very thin and small in quantity. Homosassa took the first prize for the best single orange at the State fair in 1877." (Report of Pomological Committee of Fla. F. G. A.)

This orange originated in the grove of Hon. Mr. Yulee, at Homosassa, Fla.

Higley's Late.

Indian River.—Superior native seedling; very thorny.

Italian.—"Medium large; skin thin; pulp rich; very prolific, and nearly thornless." (Wheatley.)

Imperial.—Originated on Indian River, in the grove of Mr. C. B. Magruder.

Jaffa.—One of General Sanford's importations from the eastern Mediterranean. The fruit was one of the four varieties that scored over ninety points at the Orlando exhibition in February, 1887. Tree nearly thornless, a strong grower, and with beautiful and distinct foliage.

Konah.—Recently from the Sandwich Islands via California.

King of the Halifax.—Native seedling of good quality.

Kowla.—From the Himalayan region of India.

Large Chinese.

Lee.

Loretto.

Leve.

Long.—New variety, not yet tested.

Magnum Bonum.—"Size, large to very large; flattened; color, light clear orange; eye set in a slight cavity; stem inserted in a narrow depression; skin very smooth and glossy; thickness of skin $\frac{1}{8}$ inch; longitudinal diameter, 3 inches; transverse, $3\frac{3}{8}$; color of flesh, light; grain very fine, tender, and melting; fruit very heavy and juicy; sweet, rich, and vinous." (Pom. Com. of Fla. F. G. A.)

"Magnum Bonum was awarded the Bidwell prize of \$50 at the State fair of 1878 for the best peck of oranges, in competition with over forty varieties; also, the first prize awarded to the best peck at the State fair of 1877." (Bidwell.)

Maltese Blood.—"Medium size; round or slightly oblong; very juicy, sweet, and of sprightly flavor; pulp marbled with red. This red mark

* Size, medium; shape, nearly round; color, rather pale; skin, smooth; pulp, rather free from core, and quality good but not extra. See my annual report for 1887. (H. E. VAN DEMAN.)

shows but little in fruit from young trees, but on old trees the pulp becomes quite red late in the season. Quality, best. Tree, strong bushy grower; thornless; foliage distinct; good bearer. Imported." (G. H. Norton.)

"Size medium, round; flesh streaked with red, increasing till late in the season, when the whole pulp is colored; quality, good; flavor, excellent. Tree a good grower, an early bearer, and entirely thornless. This orange always commands the highest market price." (A. L. Duncan.)

Maltese Oval.—"From the Mediterranean. Imported by General Sanford. Thornless, rapid grower, very prolific; fruit oval in shape and of a beautiful orange color, medium in size, and bears transportation unusually well. Of some twenty boxes we shipped to England last winter, there were only ten oranges spoiled on arrival in the lot. This variety is a particular favorite in the London market. It is probably more largely planted here in Orange County than any other kind." (Kedney.)

Majorca.—"Size, medium; round, rich, juicy, and sweet; a good keeper and shipper; quality best. Tree a strong bushy grower, very robust; foliage distinct; nearly thornless; fine bearer; imported from the island of Majorca by General H. S. Sanford." (Norton.)

"The Majorca has a more handsome and thinner rind, more attractive in shape, not seedy, but more so than the Jaffa, but its flavor and acid in a hot spring day are unsurpassed to quench thirst." (Phelps.)

Marquis.—Recently imported from Malta by Colonel Church, of Orlando.

Madame's Sweet.—Native seedling, from Colonel Magruder's grove at Rockledge, Indian River.

Madame's Vinous.—Another from the same source. "Colonel Magruder's Madame's Vinous, as will be seen by reference to the table, scored, with the exception of the Washington Navel, the highest of any orange examined by the committee, reaching ninety-two and one half out of one hundred points; it was declared by the committee, several of whom were experts in orange testing and nomenclature, to be the finest orange they had ever tasted, being out-ranked by the Navel only, because it had seed and pulp, while the latter had no seed; in flavor and sweetness it out-ranked the Navel." (A. H. Manville; report of S. Fla. Ex. in Dispatch for February 28, 1887.)

Mangosteen.—Native seedling, originating in Sumter County.

Malta St. Michael.

Markham's Best.

Markham's Premium.

Macrocarpa.

Melitensis.—Introduced from Paris, France, by the Department of Agriculture at Washington. A good grower.

* This variety now gives evidence which leads me to think it may prove to be identical with Washington Navel. (H. E. VAN DEMAN.)

Melitensis Sulcata.

Mediterranean Sweet.—"Medium size, seedless; skin smooth, pulp melting; quality good. Tree thornless, prolific, and bears second year from the bud; foliage distinct. Habit reclinate. Moderate grower; with us has fruited the earliest and heaviest of all." (A. H. Mauville).

First imported by Mr. A. J. Bidwell.

Mediterranean Sweet (Garey's).—A variety first imported from Thomas Rivers, of England, by Messrs. Ellwanger & Barry, Rochester, N. Y., and by them propagated (under names on the original labels), and one of the trees sent to Mr. Thomas A. Garey, Los Angeles, Cal., labeled "Shaddock," in the year 1870. After fruiting, the variety was sent to Mr. Bidwell, at Jacksonville, Fla., for the true name, and by him pronounced to be the Mediterranean Sweet, of which variety he already had trees at that time in his nursery. It is said, however, to have proved to be a slightly different variety, "closely resembling the Mediterranean Sweet, but the fruit of superior quality, and a very late ripener."*

Mediterranean Sweet (Sanford's).—Distinct variety, imported by General Sanford. Is described as follows: "Size medium to large; round or slightly flattened; skin firm and of even thickness; juicy, sweet, and rich; one of the most valuable. Tree a good grower, with few thorns; early and profuse bearer." The true name of this variety is said to have been lost.

*Mediterranean Blood.**Moore's.*

Navel (Australian; synonyms, *Umbilical*, *Pernambuco*, *Seedless*, *Em-bigo*).—"Size large to very large; eye presenting an umbilical appearance, from which it obtains its name; stem inserted in a shallow ribbed cavity, with deep lines; skin, three-sixteenths thick; longitudinal diameter, $3\frac{1}{2}$; transverse, $3\frac{1}{4}$; flesh very fine, melting and tender; juice sweet, sprightly, vinous, and aromatic; quality, first." (Moore.)

Originally from Bahia, Brazil, by way of Australia and California. Tree shy bearer.

Navel (Parsons's).—Introduced into Florida in 1869 by Mr. S. B. Parsons, of Flushing, Long Island, who imported it from Mr. Thomas Rivers, of England. Very juicy, but a shy bearer.

Navel (Platt's).—Evidently distinct.

Navel (Atwood's Seedless).—Probably identical with Washington Navel, as it has been traced to trees received from Washington, D. C. under the name Bahia. (Van Deman.)

Navel (Ormond's Prize).—Thought to have originated from the same source.

Navel (Sanford's).—"A fine-flavored fruit, often with pink-tinted pulp, and marked on the apex with a small protuberance." (E. H. Hart.)

* To me this orange seems identical with Maltese Oval. (H. E. VAN DEMAN.)

Navel (Sanford's, from Belgium).—An extraordinarily prolific bearer.

Navel (Whitner's).—"From a tree sent from the Department of Agriculture, in 1873, to Colonel Whitner, of Orange County." Very seedy; distinct.

Navel (*Washington*; synonyms, *Bahia*, *Riverside Navel*).^{*} The trees of this remarkable variety were first imported by Mr. Saunders, of the United States Department of Agriculture, from Bahia, Brazil, in 1870. They were twelve in number, supposed to be all alike, having been propagated and grown in Brazil especially for the Department and under the direction of the Commissioner of Agriculture. They were named by Mr. Saunders "*Bahia*," in honor of the place from which they came. Two trees propagated from these were sent to Mrs. L. C. Tibbetts, of Riverside, Cal., in 1873. When these trees fruited and their superior quality was ascertained they were called by the orange-growers of California the "*Washington*" or "*Riverside*" *Navel*, to distinguish the variety from the Australian *Navel*, then commonly grown. The fact is also established that the true *Washington Navel* was also sent to Orange County, Fla., about the same time. In 1882, Mr. A. J. Bidwell procured buds of this variety from Mr. A. D. Haight, a near neighbor of Mrs. Tibbetts. Trees from both these sources have been bearing in Florida for a number of years, clearly proving it a distinct variety, and far superior to the old *Parsons Navel*. The orange is practically seedless and unsurpassed in quality.

Navel (Blood).—A supposed cross between the *Washington Navel* and *Maltese Blood*, produced by Mr. E. H. Hart.

Navel ("Blind").

(The foregoing list of the varieties of the *Navel* orange, their origin, manner of introduction, etc., has been carefully and laboriously gleaned in a great measure from the multitude of facts evolved by the discussion of the varieties of the *Navel* orange during the past summer in the columns of the *Florida Dispatch*, and partly determined from personal observation. There is but little doubt that most of the oranges named constitute distinct varieties, many of them of great excellence, although some still hold to the opinion that these differences are in a great measure caused by peculiarities of soil, climate, and treatment.)

Nicaragua.—Imported by way of California.

Nonpareil.—"Size, above medium, somewhat flattened; color ordinary; eye broad and set in a slightly-depressed cavity; stalk inserted in a level scarred surface; skin three-sixteenths of an inch thick; lon-

^{*}After examining specimens of fruit from many places in Florida and California under all of these synonyms and those grown on the original trees here, and having read what has been published in the papers on the subject, I see no reason for believing that all of the twelve trees imported from Brazil are not all of one variety. Judging from what I have seen of the behavior of this tree in bearing and the testimony of many persons of large experience with it, there is no escaping the conclusion that the *Washington Navel* is a poor bearer, except perhaps in certain sections of California and Florida. (H. E. VAN DEMAN.)

itudinal diameter $3\frac{1}{4}$ inches; color of flesh ordinary; grain fine; pulp melting and tender; juice subacid and vinous. Nonpareil took the first prize at the State fair of 1878 for the best peck and best ten oranges." (Rept. of Pom. Com. of Fla., F. G. A.)

Nutmeg (Enterprise Sport.)—Very strongly marked, but otherwise comparatively worthless.

*Onoro No. 1.**—Originated in the grove of Rev. Lyman Phelps. "It is a seedling from a Maltese Blood; it is the best orange from the first bearing I ever saw. My neighbor, Colonel Whitner, says it is the best orange he has eaten the past season." (Phelps.)

Onoro No. 2.—From the same source. "This is also from a Blood orange, the seed of which was planted on a certain wedding-day. The small tree was brought here and has been fruiting nine years. It is sweet, earlier than any orange I have, save the insipid Sweet Seville." (Phelps.)

Osceola.—"Size large, slightly flattened; color bright; skin smooth and glossy; eye very small and set in a slight cavity; stem inserted in a small, shallow, wrinkled depression; thickness of skin three-sixteenths of an inch; longitudinal diameter 3 inches, transverse $3\frac{1}{4}$ inches; grain coarse; pulp rather melting; juice sweet, quality good; seedling, raised by L. H. Van Pelt, Mandarin, Fla." (Moore, from Rep. of Fla. F. G. A.)

Orange Lake.—Native seedling, of good quality.

Parson Brown.—"Size medium, oblong; skin smooth; fine flavor; a fine shipper, and by some considered the best of the early oranges. It begins to ripen in October." (A. L. Duncan.)

Paramatta.

Peerless (syn. *Rembert's Best*).—"Large round; color, light clear orange; skin smooth, firm and thin; juicy, subacid; flavor delicious; quality best. Tree prolific and vigorous." (Manville.)

Originated on Drayton Island, St. John's River.

Pine apple.†—"A new variety of Magnum Bonum, Homosassa and Nonpareil type, recently brought to public notice. Originated in the grove of Hon. P. P. Bishop, in Union County. Said to be very fine." (Manville.)

Pierce's Blood.—"One of the handsomest oranges grown; fruit colors early; very good early in the season, and improves in quality until March or April; can be shipped any time from November to April; fruit medium size; skin thin and leathery; pulp mottled, blood red late in the season; flavor superior. Fine grower and nearly thornless." (F. S. Cone.)

Pierce's Champion Prolific.—A Florida seedling, introduced by Mr. R. W. Pierce, of Indian Springs, Fla., who describes it as follows: "One of

*The specimens sent to this division by Mr. Phelps, of Sanford, Fla., last spring, were of most excellent quality, being sweet and yet of very sprightly aromatic flavor. (H. E. VAN DEMAN.)

†Medium size, round or slightly flattened; skin smooth, thin, and of a dark orange color; flavor very pleasing; said to be a poor bearer. (H. E. VAN DEMAN.)

the very best Florida oranges grown ; so pronounced by every one who has tested it. Fruits young, often at two years from budding. Bears heavy and regular crops. Medium size ; ripens early, and keeps well on the trees till late in the season ; ships well ; skin thin and leathery ; fruit very tender ; juice rich, and with spicy flavor ; few seeds. Tree rapid grower ; few thorns on old wood."

Phares.—Originated in Sumter County.

Poor Man's orange.

Poncina Musatania.

Portugal.—Imported via California.

Pride of Malta.—Imported six years ago by Mr. J. A. Bostrom, of Ormond, Fla. Fruit medium size, flattened ; skin somewhat rough ; juice very sweet ; attaining perfection in November. Tree a vigorous grower and of fine form ; branches nearly thornless.

Prata (syn. Silver Orange).—"Rind pale yellow and thin ; flesh pale, flavor piquant and delicious." (Manville.) Imported.

Prolific.

Queen.—Recently imported. Thorny.

Queen of the Halifax.—Native seedling, from Ormond, Fla.

Robert's Acme.

Rio.—Imported. Not thoroughly tested.

Ruby.—"A new orange, of superior quality, recently imported. Tree of strong, vigorous growth ; nearly thornless. Fruit rather below medium in size ; nearly round ; skin very thin and smooth ; pulp in March and April ruby-red." (F. S. Cone.)

Saint Jago.

Sabrina.

Sandwich Island.

Saint Michael's.—"Medium size, round, thin skinned, nearly seedless, and juicy ; quality good. Tree bears young ; prolific ; few thorns ; foliage distinct." (Manville.) Originally imported from the island of that name.

Saint Michael's, Large.

Saint Michael's, Small.

Saint Michael's Paper-Rind. *—From California, where it is highly recommended. Said to be thinner-skinned variety of the Saint Michael. Described as a "small, but first-class orange, of very fine flavor. The tree is somewhat thorny, a good grower, and very prolific bearer." Has fruited in Florida.

*Having seen a great many specimens of this variety from California, and all very small, slightly oblong, very smooth and thin skinned, and very pale colored, I think it quite distinct from Saint Michael. It is there claimed to be the result of bud variation, and possibly this may be true. But the contrast is very marked in all respects except shape and flavor.

Specimens from J. E. Cutter, of Riverside, Cal., gathered from the same tree and the same bud, were true types of the two varieties, and in all the above respects widely dissimilar. (H. E. VAN DEMAN.)

Saint Michael's Blood.—Imported by General Sanford.

Saint Michael's Egg.—"Large, oval; thick skinned; juicy, but not rich; quality fair. Tree prolific; few thorns." (Manville.)

Seletto.

Selecta.—"Almost thornless, strong grower, imported recently from Brazil; early and prolific bearer; more generally free from rust than any kind we know; orange flattened in shape; extra good shipper; and the finest-flavored variety that we know." (Kedney.)

Sicily.

Sirinaggar Cindra.—From the Himalayan region of India.

Star (Drake's).—"Fruit large and very handsome; slightly flattened, and distinctly marked with stripes (rather longitudinal ribs); of the best quality. Tree a rampant grower; form an umbrella-shape; entirely thornless after six or seven years old; foliage of light color, the leaves being peculiarly crimped. A very distinct variety, and undoubtedly imported. There are several large trees of this variety budded on sour stocks in the grove of Mrs. C. B. Drake, of Drake's Point, Fla., but its origin is unknown." (Norton.)

Star-Calyx.—"A new variety, of peculiar-looking foliage, rather crimped, limbs drooping in habit, early and prolific bearer; fruit small in size, of very sweet and rich flavor." (Kedney.)

Starke's Best, *Starke's Favorite*, and *Starke's Seedless*.—Among the most excellent of native sorts.

Spratt's Harmon.—"Native seedling; excellent every way; said to be very prolific." (Manville.)

Spicer's Seedless.—Has few seeds; quality fair.

Sustain.—Introduced by S. B. Parsons, from Thomas Rivers, of England. It is a very poor bearer, but the fruit is of good quality. Rather small.

Sweet Blood (John Saul's).

Sweet Blood (Sanford's).

Sweet Seville, *Hick's* (synonyms *Sugar Sweet*, *Golden Angel*, *Picnic Orange*).—"Size small, slightly flattened; color comparatively deep; eye small, without depression; skin very smooth; thickness $\frac{1}{8}$ of an inch; longitudinal diameter 2 inches; transverse $2\frac{3}{8}$ inches; color darker than Washington Navel orange; foliage differs from other varieties examined; leaves markedly obovate; average length about $3\frac{1}{4}$ inches, width about $2\frac{5}{8}$ inches; grain very fine, juicy and melting; juice very sweet and sprightly; quality best; a superior fruit in every respect except size. Supposed to be a seedling, raised at Arcadia, Saint John's County, Fla." (Com of Fla. F. G. A.)

Sweet Seville (Tolman's).—"Size below medium, but larger than Hick's variety; form flattened; color light orange; eye large, without any cavity, and surrounded by a dark circle; stem inserted without cavity; skin smooth and $\frac{1}{8}$ of an inch thick; longitudinal diameter $2\frac{1}{4}$ inches,

transverse 2½; pulp fine, melting, juicy, sweet; inferior quality to Hick's variety. Origin, Mandarin, Fla." (Com. of Fla. F. G. A.)

Tahiti.—"Large size, round; pale yellow; skin very thin; grain fine; pulp tender and melting; juice subacid; quality good. Tree vigorous, prolific, and very thorny. Imported." (Manville.)

Teneriffe.

Tucker's Seedling.—A native variety, from Sumter County, Fla.

Tuberoze.

Variegated (Beach's).—Foliage and fruit beautifully variegated with creamy white and green. A sport from Beach's No. 5. A strong grower and first-class fruit.

Valencia August (syn. *Valencia Late*).—Sometimes known in California as Rivers's Late. Introduced to California by Mr. Chapman, from Rivers's nursery, England, marked as Navel, but when it came into bearing was recognized as the orange known as Valencia August in Spain. It was introduced recently to Florida from California, and also, several years ago from the Mediterranean, by Colonel Church, of Orlando.

Tree said to be a good grower, somewhat resembling the Washington Navel in habit of growth. Fruit said to resemble Mediterranean Sweet, except in color, being lighter colored, firmer, and having smoother rind. Considered by some superior to Mediterranean Sweet. It is marketed in July in California. Is yet but little known in Florida.

Velvet Peel.

Whitaker.—The Whitaker orange is the choice of a remarkable grove of trees, planted on Sarasota Bay over forty years ago by Colonel Snell, on the old Whitaker homestead. The trees were from selected Havana seed. The Whitaker is of medium size, sweet, and one of the finest native varieties in the State. Fruit at its best in January and February.

Whitaker No. 2.—By some considered superior to the above. Flavor rich and sparkling; fruit above average in size.

Whitaker Blood.—Skin and pulp dark orange.

White.—Imported. Large pale yellow; flesh pale; flavor rich and good. Bears young.

II.—CITRUS AURANTIUM NOBILIS.

(THE MANDARIN, AND TANGIERINE.*)

This class is characterized by loose rind; segments easily divided; fruit and foliage highly and peculiarly aromatic; trees usually dwarf or half-dwarf.

Bouquet des fleurs.—Possibly not of the Mandarin class, but apparently so. Very ornamental, but fruit of little value.

Canusa.—Sour and practically worthless.

China (synonyms, *Mandarin*, *Kid-glove*, *Tomato*, *Willow-leaved*, etc.)—"Size medium; much flattened; color dark orange; broad, irregular

* The Tangierines are darker colored than the Mandarins, but otherwise I can see no difference. (H. E. VAN DEMAN.)

cavity, with stem obliquely inserted and surrounded by a knobbed eminence; eye set in a large depression one inch wide and five-sixths of an inch deep; longitudinal diameter $2\frac{1}{2}$ inches; transverse diameter 3 inches; skin irregularly ribbed or lobed; color of flesh very dark orange; pulp adhering to skin by a few filaments; sections of pulp easily separated; pulp coarse, juice sweet and highly aromatic; aroma marked; quality first. Tree of original variety introduced by Major Atway from Bayou Sara, La., and now growing in the grove of Dr. Morague, at Palatka." (Rep. of Com. of Fla. F. G. A.)

Tree thornless, or nearly so. Branches slender, willowy.

China Celestial.

Cleopatra.—Thought by some to be identical with Spice Tangierine, but its identity is hardly decided yet.

*King** (often miscalled King of Siam).—Introduced from Cochin-China, in 1882, by Dr. R. Magee, of Riverside, Cal., and into Florida the same year by Mr. John Carville Stovin, of Winter Park, who obtained buds and two trees of the original importation from Dr. Magee. Fruited last year for the first time. It is described as a large orange, flattened, but not so much as the Tangierines. Skin rough, but general appearance fine; segments and rind loose; fruit juicy; flavor good; membranes of brownish color, but with no bitter taste; color of flesh, deep yellow; contains few seeds; rind aromatic. In all respects a superior variety. Attains perfection in June. Tree very thorny.

Mary Bement.—One of the most thorny of the Tangierine class.

Mandarin (Coolie).

Mandarin (Canton).

Mandarin (Dwarf).

Mandarin (Rook's).—"Rooks' Mandarin has the merit of lateness, being now quite juicy (February), while most sorts are getting dry and worthless." (Manville.) Seedling originated by Maj. O. P. Rooks, of Gardenia.

Mandarin (Emperor).—"The tree is similar to the China or Willow, and is supposed to be a seedling of same. Fruit twice the size of the China, but the same in other respects. Good grower and thorny; very prolific." (Wheatley.)

Mandarin (St. Michael's).—"Fruit slightly pear-shaped; in other respects resembling the China." (Manville.)

Mandarin (Spice).—Perhaps identical with Spice.

Mandarin (Thorny).

Satsuma (synonyms, *Unshiu*, *Oonshiu*).†—"A native of the island of Kiusin, Japan, and named after one of the chief cities of that island by

* Specimens from California and Florida were of medium size, and the flavor tart for an orange, but pleasant. Skin sticks closer to the pulp than common Mandarins. (H. E. VAN DEMAN.)

† After carefully examining many specimens from Japan, California, and Florida, as well as bearing trees in California, I have no hesitancy in saying that Satsuma and Unshiu are identical. (H. E. VAN DEMAN.)

request of Mrs. General Van Valkenburg. The trees of this variety were introduced into Florida by Dr. George R. Hall in 1876, and also by Mrs. VanValkenburg in 1878. The trees were imported direct from Japan. The fruit is medium-sized, flattened, of deep-orange color; smooth, thin skin, which is sweet, aromatic, and easily detached from the pulp; color of pulp, dark orange; segments part freely; fine grain, tender, juicy, sweet, and delicious. There is none of that peculiar rank odor which characterizes most other varieties belonging to the same class and species. The tree is thornless, the leaves peculiarly thick, scarcely lanceolate, serrated, medium, petiole linear, and the fruit is seedless, or nearly so." (George W. Davis.)

The Satsuma has proved the most hardy of all oranges yet introduced. It is a slow grower; habit reclinate and dwarf.

Tangierine (Porter's).—A remarkable seedling originating in Orange County. Almost entirely thornless; a stiff, upright grower; leaves more nearly round than ordinary orange leaves, very large, and peculiarly notched. Fruit described as first-class.

Tangierine, Dancy's (synonyms, *Red Tangierine*, *Bijou*, *Moragne's Tangierine*).—"Size small; much flattened; color deeper and more brilliant than parent variety (China); longitudinal diameter, $1\frac{3}{4}$ inches; transverse diameter $2\frac{1}{4}$ inches; the eye set in a deep cavity seven-eighths in diameter; stalk straight and inserted in a ribbed depression; thickness of skin, three-sixteenths; general properties of pulp same as parent, only superior; fruit nearly seedless. In flavor and external appearance this variety is superior to the original. Seminal variety of the *Tangierine* raised by Col. F. L. Dancy, Buena Vista, Saint John's County, Fla." (Rept. of Com. of F. F. G. A.)

The foliage of Dancy's *Tangierine* more nearly resembles that of the ordinary sweet orange than the other varieties of this class; tree thorny; an upright grower.

Tangierine (Spice).—Introduced by Colonel Codrington from Jamaica. Stands a great deal of cold unharmed.

Tangierine (Large).

Tangierine (Small).

Tangierine (Japan).—"A thornless variety of Red *Tangierine*; of peculiar habit." (Norton.)

The following list of Japanese oranges comprises varieties just introduced by way of California—not yet tested in Florida, and not accurately determined botanically in all cases :

Baka.

Bushinkau. — Buddha - finger
orange.

Dai-Dai.

Jokon.

Jagatara.—Mikan.

Judzu.

Kino.—Kuni, Mikan.

Kiu.—Kunenbo.

Kiku.—Unshiu, Tatchibana.

Kunenbo.

Naruto.—Mikan.

Tou.—Mikan.

Tama.—Mikan.

Tamabuku.—Mikan.

Tatsushiru.—Mikan.

III.—CITRUS AURANTIUM BIGARADIA.*

(The types of this subspecies or variety are the native sour and bitter-sweet oranges of Florida, thought to have been introduced by the Spaniards at the time of or before the first settlement of Florida.)

Bitter Sweet.—"Medium sized; juice sweet and pleasant when separated from the inner bitter rind. Used in summer as a substitute for the sweet fruit. Tree indistinguishable from the *sour*. Native wild orange of Florida." (Manville.)

Bitter-Sweet (Phillip's).—An improved variety of the above, planted quite often as a summer fruit. Brought to public notice by Mr. A. J. Bidwell.

Dwarf Orange.—In most of the State catalogues and reports called *Citrus Japonica*, which seems to be erroneous, as *Citrus Japonica* is the *Kumquat*, according to the best authorities. It is probably the *Citrus aurantium Sinense pumilum* of Galesio.

"An ornamental dwarf tree resembling the sour orange. Fruit resembles the sour, though not nearly so bitter, and is esteemed for preserving." (Manville.)

Sour.—"Large; color dark; grain coarse; inner rind bitter; juice acid. Retains its perfection through the summer, when it is much prized for its refreshing acid juice. Used also for making marmalade and conserves. The tree bears young; very prolific; vigorous; makes a desirable and ornamental shade tree. Native wild orange of Florida." (Manville.)

Sour (Italian).—"Tree thornless and of vigorous habit; makes a fine round head; fruits very young; very prolific. When the fruit is ripe it makes a very fine appearance as an ornamental tree, the fruit remaining on very late in the season. It is esteemed by some for making a drink." (Pierce.)

Willow-leaved (Italian).—This variety is said to very much resemble the Italian Sour, except in foliage, which is willow-like.

Variegated (Sour).—"Leaves and fruit mottled with white, pale straw-color, and several shades of green; highly ornamental." (Manville.)

Variegated (Golden).—Leaves mottled with a rich golden color.

Variegated (Bitter-sweet).

IV.—CITRUS AURANTIUM BERGAMIUM (Risso).

Bergamot (synonyms *Bergamot orange*, *Bergamot lemon*).—"Fruit pear-shaped; pale yellow, with green, subacid, firm, fragrant pulp; fruit and foliage distinct." In Europe the fragrant oil of bergamot is obtained from the rind.

* Escaped from the gardens of the early Spanish settlers in Florida and South America to the forests, and hence by some incorrectly thought to be indigenous in America. (VAN DEMAN.)

V.—CITRUS SINENSE MYRTIFOLIA.

Myrtle-leaved orange.—Evidently a sub-species of *Citrus aurantium*. "A handsome dwarf tree, with small, dense, dark-green, glossy leaves; bearing a small flattened fruit of little use. A beautiful shrub for ornamental grounds." (Manville.)

VI.—CITRUS AURANTIUM SINENSE PUMILUM FRUCTU DULCI (OF GALLESIO).

Probably the Otaheite, grown in Florida as a stock upon which to dwarf the sweet orange. Dr. Kenworthy, of Jacksonville, who first cultivated dwarf orange trees in Florida, used this as a stock, though the Trifoliata is more used at present. It is described by Mr. Manville as "a dwarf variety, bearing an abundance of reddish flowers, and small showy fruit; sweet, and thin-skinned. A pretty ornamental shrub."

VII.—CITRUS DESIMATUS.

Of no probable value for its fruit. Is described by Mr. Manville:

One of the curiosities of the Citrus. Foliage peculiar; leaves of drooping habit; has the appearance of being varnished; no two leaves alike in shape; fine for ornamental grounds.

REMARKS.

The principal stocks in use by the nurserymen of Florida to work the orange on are the seedling sweet orange, the sour orange, and the "French" or Florida Rough lemon. It is claimed by some that trees budded on the sour orange are more hardy than those on the sweet stocks. Others can detect no noticeable difference in their ability to stand cold. Either are good stocks, and both have their adherents. The pomelo or grape-fruit is also used to some extent, and is about as hardy as the sweet orange, and a good free-growing stock. The Rough lemon is most desirable on poor land or on low and wet land, as it succeeds better than any other stock in such locations, being a free rampant grower, not particular as to location.

Most nurserymen of the State advocate low budding, so that in case of severe freezes the trees may be banked with earth above the buds, and the variety thus preserved.

The Trifoliata and Otaheite are used as stocks to dwarf the orange, but their culture is not desirable, except on city lots or in frosty localities where protection is needed.

The orange is invariably *budded* in Florida, as grafts do not succeed so well, the operation is not so simple, nor the probabilities of success so great as in the process of budding. In case an orange *bud* does not "take," nothing is lost but the comparatively worthless bud, and in grafting there is great risk of losing the entire top of the young tree,

thus retarding its growth a year or more. The process of budding, too, can be practiced during nine or ten months in the year.

The best growers advocate training the trees into a low bushy head. By this means the trunk of the tree is protected from sun and frost (and is invariably in a more healthy condition than the hide-bound trunks of those trees that are trained not to branch until a height of 6 or 8 feet is reached), and the oranges are more easily gathered than from a tall tree and not so liable to be blown off during high winds. By the low bushy system of training the most healthy head is produced, as in all cases the strongest, thriftiest shoots appear from low down on the trunk. This at least is the case until the tree becomes old. There are many advocates, however, of the system of high pruning, and there is no doubt but what the system has its advantages, not the least of which consists in the ease with which the tree may be cultivated.

The wild sour-orange hammocks of middle Florida have long since been converted into sweet-orange groves by budding them, and no land of this kind remains or is accessible to the prospective orange-grower. Nursery-grown trees are used altogether in planting out groves at present.

The "old-fogy" generation of seedling orange groves has about disappeared, except in the more remote parts of the State, as the advocates of seedling apple trees disappeared years ago in the North before the lovers of improved, well-marked, and superior varieties of fruit. The advocates of seedling orange groves in Florida, are in many cases found to have seedling groves for sale. Many of the finest oranges in the State, too, are native seedlings, and the raising of new and choice seedlings should continue; but this matter can be simplified by budding from the most promising small seedlings onto the branches of large bearing trees, and thus determining the quality of the fruit five or ten years earlier than would have been determined had they been planted out in grove form to grow to the full stature of trees before bearing fruit, and also at a great saving of labor and care and avoiding a risk of total disappointment. The choicest varieties once determined, uniformity and superior excellence are best kept and disseminated by budding.

The orange-wine industry is being developed to quite an extent in Florida; both sweet and sour oranges are used. Perhaps of more importance is the perfumery industry. A company in Jacksonville are doing good work in the development of this important adjunct to orange growing. Sheets are spread under the blooming trees, and the fallen blossoms used for the manufacture of perfumes. Jasmines, gardenias, tuberoses, rose geraniums and other plants are used also.

Perhaps the most popular varieties of oranges being planted at present throughout the State are the Washington Navel, Hart's Late, Jaffa, Maltese Blood, Early Oblong, Mediterranean Sweet, and Majorca, besides the choicest native varieties. The relative merits of many differ-

ent varieties of the orange may be examined and a good idea of their qualities gained by a careful comparison and examination of the complete table of points scored by the fruit on exhibition at the Orlando fair in February last, published in the Florida Dispatch for February 28, 1887.

SHADDOCK, AND POMELO, OR GRAPE-FRUIT.

(*Citrus aurantium decumana*.*)

The cultivation of these fruits is extending gradually, especially of the pomelo, which is a first-class marketable fruit, very valuable in the spring and early summer after oranges are about gone, and by many people esteemed equal to the orange at any time. They are mostly very large, coarse fruits, natives of China and Japan, and first brought to the West Indies by one Captain Shaddock, from whom it has taken its name. There are said to be forty or more distinct varieties of the shaddock. In Florida, especially in Hernando, Hillsborough, Manatee, and Sumter Counties, there are many seedling unnamed varieties of the shaddock and pomelo, varying considerably in size, quality, and general appearance. The shaddock tree is one of the most handsome of the genus. The fruit of some varieties occasionally attains a weight of 15 pounds. When the pomelo becomes better known in the northern markets it will become a popular fruit during the spring months. It is prepared for the table by removing the bitter white membranes, and sprinkling the pulp with sugar, when it is a delicious dish. (Various ways of preparing the pomelo, orange, lemon, pine-apple, and other semi-tropical and tropical fruits are given in Miss Helen Harcourt's "Florida Fruits," a most valuable and useful work for any house-keeper.)

VARIETIES.

(The shaddock is also known as Pompelmouse, or Pummelow.)

Bahama shaddock.—"Very large; round; pink flesh; excellent." (Norton.)

Blood (syn. *Pink*).—Very large, with pink pulp. Tree very handsome and strong grower.

"Forbidden Fruit."—Introduced from South Africa by Colonel Church, of Orlando. In habit of growth distinct from any other citrus. New growth slightly tinged with red, as is the lemon. Extraordinarily cooling and refreshing qualities are claimed for the fruit, which has not yet been produced in Florida.

Horton's shaddock.—Large, with green pulp. Habit of tree, spreading.

Mammoth.—Very large, skin smooth and glossy; rind thick, white, spongy, and bitter; pulp green, watery, and subacid.

* *Citrus pomelanus*, when applied to the pomelo or grape-fruit. (VAN DEMAN.)

Pomelo.*—Much larger than an orange and smaller than ashaddock ; a delicious fruit, preferred by many to the orange. Skin smooth, pale yellow ; subacid. The membrane dividing the pulp is bitter, and must be removed before eating the pulp. Also called "grape-fruit" from its habit of growing in clusters.

Improved Pomelo.

Pernambuco Pomelo.—Has not fruited in Florida. Introduced through the United States Department of Agriculture at Washington.

White-fleshed Pomelo.—Variety from India.

Red-fleshed Pomelo.—From the same source. Recently introduced.

Canton Pomelo.—"Very large, round ; red flesh."

KUMQUAT.

(*Citrus Japonica*, Thunberg.)

The kumquat is a native of Japan, and is much cultivated in China also. Its cultivation is extending in Florida. It is very hardy ; leaves small, somewhat resembling those of the Mandarin orange. It is a shrub, in cultivation not allowed to exceed the height of a gooseberry bush. The fruit is about an inch in diameter, of deepest orange color, and very handsome. The rind is sweet and the juice acid ; delicious and refreshing. The Chinese are said to make an excellent sweetmeat of this fruit by preserving it in sugar. In Florida it is worked on ordinary orange stocks.

VARIETIES.

Oval.—In commonest cultivation. Longitudinal diameter about 1½ inches ; transverse, 1 inch.

Round.—Recently introduced.

Kin-Kan.—"A highly-esteemed variety from Japan." (Van Deman.)

CITRON.

(*Citrus Medica Cedra*, Galesio.)

The citron is a fruit almost invariably neglected by the fruit growers of Florida, and though it might become a valuable article of export, even single specimens of the shrub are rarely seen. It is more tender than any of the preceding fruits, and forms a low, straggling bush—rarely over 8 feet in height—but the recumbent branches rooting and extending until a perfect thicket is formed, in which the identity of the parent tree is almost lost. The thick, spongy rind of the citron, when prepared, is the candied citron of commerce. For years the process of preparation for commercial purposes was not understood, but it is said

*This fruit sells in the northern fruit-stores at from 7½ to 15 cents each during the spring and summer, when the main orange season is over. The taste is peculiar, but is soon learned to be liked. To me, nothing is more refreshing on a hot day. The name "grape-fruit" seems much less suitable than pomelo. (H. E. VAN DEMAN.)

that a California firm is preparing it now. Miss Helen Harcourt gives the following directions for preserving citron in her "Florida Fruits":

Dried citron for home or market.—Pick the fruit when green, just as it comes to maturity; cut into four or six pieces; soak in clear water containing a little alum and a few handfuls of green grass (Guinea preferred), or the leaves of the citron tree; pour this off, and boil half an hour in thin sirup, then weigh the citron and add an equal weight of white sugar to the sirup; dip the citron into the latter two or three times; dry in the sun one day; the second day fill the cavities of the citron with the sirup, and continue to expose to the sun until thoroughly dry. This makes an excellent article for commerce, being of superior quality to that sold in the stores at 50 to 60 cents per pound.

Preserved citron.—Never use ripe citron in any shape; it will not dry nor make a good preserve. Take green citron, full-grown but young and tender; cut into four pieces and take out pulp and seeds; lay the citron in salt and water for twenty-four hours; take it out and scald it two or three times until the bitter is extracted; then make a moderately thick sirup, and boil the citron in it gently until clear and translucent; then flavor sirup with lemon juice, allspice berries, stick cinnamon, or root ginger.

VARIETIES GROWN IN FLORIDA.

Lemon citron.—"Shape oblong, like a lemon; size, very large, weighing from 2 to 8 pounds; skin light yellow, rough and glossy; inner skin thick, spongy, and aromatic." (Harcourt.)

Lyman.—A citron imported from the Mediterranean by General H. S. Sanford, and, though imported without name, believed to be the true citron of commerce. Fruit said to be superior to the varieties heretofore grown in the State, "the rind being sweet and edible in a fresh state, and making a most delicious conserve." Named by the Florida Nurserymen's Association, August 9, 1887, in honor of Rev. Lyman Phelps, who brought it to public notice.

Orange.—"Shape round, like an orange; size, large; skin pale yellow, rough and glossy; inner skin white, coarse, and thick." (Harcourt.)

LEMON.

(*Citrus Medica Limonium*, Risso.)

Lemon culture in south Florida is making rapid strides of progress. Well-informed cultivators know that the lemon is a necessity to the people of the United States; that there is a market for every first-class lemon that can be produced, and more, too. Besides being a necessity in cases of sickness, no well-regulated housekeeper in the land considers herself "equipped for culinary campaigns" without lemons in the house. In warm weather no restaurant, saloon, nor street stand can exist without lemons, and plenty of them; no church fair, Fourth of July celebration, or Sunday-school picnic is at all well managed without at least an appearance of lemons; and so it is that such far-sighted men as General Sanford and others imported and planted lemons largely in the last decade.

The time was, and not so very long ago, either, that the most of the people in Florida believed that a marketable lemon, with thin, sweet

rind, first-class acid, and medium size, could not be produced on Florida soil. The only lemons known in Florida were coarse, overgrown seedlings of the Messina and Sicily lemons, the little bushy "everbearing" variety, and the venerable "French" or "Florida Rough" lemon. Strange as it may seem, there are still persons in south Florida who cling, like the dog to the proverbial bone, to the belief that a marketable lemon can not be produced in Florida; but they are within the last ten years comparatively scarce, and there are few now, except the veriest of backwoods "crackers," who do not have at least one or two pet Genoa or Villa Francas in the yard, and still others set out twenty trees, and this man one hundred, and that man five hundred, and so on.

Lemon culture has thus far received the most attention among the progressive fruit-growers of the "lake region" of Florida, though lemons are cultivated to a certain extent all over the peninsula of Florida, and to a slight extent in lower Louisiana, especially in the parish of Plaquemines, where the commercial lemons are now receiving some attention. Florida is indebted to Mr. Bidwell and General Sanford for the first importation of the fine varieties of commercial lemons now attracting so much attention. A great part of General Sanford's large grove at Belair is planted to these lemons, and although it has several times suffered severely from cold, the trees are very healthy and thrifty. On the lower range of keys, so many of which are adapted to the culture of the lime and lemon, none of the fine varieties are yet known, but the knottiest, smallest Florida limes and lemons are grown for the Key West market.

The establishment of such model plantations as that of Messrs. T. A. & E. A. Hine, at Cocoa-nut Grove, will, however, do good service in introducing to that part of the State superior varieties of fruit, and better methods of culture.

One cause, and a just one, of the bad name which Florida lemons have had in the Northern markets, has been the indiscriminate shipment in years past (and in some cases it is still continued) of the inferior lemons so abundant in Florida. Large, fine-looking—so large that one involuntarily thinks of the bunch of grapes borne home from the promised land by the Israelitish spies—but when cut open, not exactly like "apples of Sodom," but similar. The thick, spongy rind that soon becomes bitter on exposure to the air, and the scanty supply of acid, do not speak well for Florida. The fault, however, has only been in varieties planted. To-day Florida produces as fine lemons as grow on the globe. The Villa Franca, Sicily, Belair, and Genoa are the varieties most in favor at present, and all are first-class lemons.*

The lemon is more tender than the orange, shaddock, and pomelo, but not so tender as the lime, which is almost tropical. It is claimed by

*To this I can add unqualified testimony of its truthfulness, as I have frequently and for years past tested Florida lemons by the side of the best from foreign countries. All that we need is more home-grown lemons to drive out or lessen the amount imported. (H. E. VAN DEMAN.)

some that the Villa Franca lemon will stand as much cold as the orange, but this is very doubtful. It is certain, however, that they will bear a much lower temperature than has generally been supposed previous to the freeze of 1886. Lemon trees at that time stood a continued cold as low as 17° and 19° F. in Orange County, and in many cases without material damage.

The crop of lemons in south Florida this year is probably about average. At Orlando the trees are covered with fruit in all stages of growth from blossoms to full-grown lemons, without regard to variety; Villa Franca, Belair, and Sicily lemons. It is stated that Mr. A. L. Eichelberger has three thousand boxes on his young grove at Lake Panasoffkee, and has already commenced shipping. Fair crops are reported in most localities where the commercial lemons are in bearing.

The lemon is worked on any of the stocks used for the orange. It is claimed by many that the lemons on sour-orange stocks will stand a much lower temperature than when budded on any other stock; but this point is undecided, as experiences are contradictory in some cases.

VARIETIES

(CULTIVATED IN FLORIDA)

August.—"Seedling of the Sicily lemon; imported; medium size; smooth, thin skinned; elongated; very good shipping qualities; fine acid; ripens in August." (A. J. Beach.)

Belair.*—"One of the best lemons grown in the State. Has taken several premiums at State and county fairs, and scored the highest number of points at the Orlando exposition in February last. Imported by General Sanford.

Bergamot.—"Large, rough, flattened; of little value; leaves large and broadly winged; appearance peculiar. Erroneously introduced under the name of Bijou." (Manville.)

Bijou.—"Small, smooth, thin-skinned; juicy, acid fine; foliage distinct." (Manville.)

Bracey.—"A new lemon resembling the Sicily, but scarcely equal to it in quality.

Communis.—"Imported by United States Department of Agriculture. Not well tested in Florida.

Eureka.—"Recently introduced from California; of medium size, with sweet rind and strong acid. Tree thornless; strong grower; early and prolific bearer." (Manville.)

Resembling or perhaps identical with Genoa. Often thorny when young.

Everbearing.—"Always in fruit and flower, and consequently valuable for home use. Not a first-class lemon, however. Tree bushy, inclined to sucker from the root; long grown in Florida.

* There are now on the table in this office (October 5, 1887) specimens of this variety that are filled with as strong clear acid as one could desire. (H. E. VAN DEMAN.)

Everbearing (Sicilian).—A fine lemon of General Sanford's importation. Quality best.

French's Seedling.—"A strong grower; few thorns; fruit of good quality, similar to the imported Sicily." (J. B. Anderson.)

Genoa.—Introduced from California by Mr. Bidwell about six years ago. Originally imported from Genoa, Italy. Thornless when the trees have attained size, but often quite thorny when small. Fruit of medium size, with a sweet rind and a strong pleasant acid. A very early bearer. Ripens the main crop in July and August, and on this account very desirable. A lemon without a superior in the market.

Imperial.—Imported, and not well tested in Florida. Said to be a good lemon.

Leghorn.—A promising variety, of recent importation.

Lamb.—Native lemon. "Tree a good grower; fruit medium size; thin skin; juicy; good acid." (J. B. Anderson.)

Lisbon.—"From California; thought one of the best there; strong grower; thorny; bears well; good fruit." (Kedney.)

Long.—"This lemon originated in San Mateo; is a good grower; prolific bearer; fruit medium size, smooth, good shape, and of excellent quality." (J. B. Anderson.)

Malta.—Introduced recently.

Messina.—Long grown in Florida from seed. Tree prolific, but fruit inferior and of little value compared to the commercial lemons.

Milan.—Scored fairly well at Orlando in February last.

Naples.—Recently introduced. Probably identical with Neapolitan.

Neapolitan.—Introduced through the United States Department of Agriculture at Washington.

Sicily.—Under the name have been grown in Florida many worthless seedlings, with large, coarse, valueless fruit, but the true Sicily lemon of commerce is being planted extensively now. It was imported by General Sanford, and is described as follows: "Size medium; rind sweet; skin smooth, thin, tough, and dense; membrane covering segments of pulp thin and small in quantity; pulp juicy; acid fine; quality best. Tree thornless (or nearly so) and prolific."

Imported also by United States Department of Agriculture at Washington.

Sweet Brazilian.—Introduced by Mr. Bidwell.

Snacco.—Imported by the United States Department of Agriculture. Not much tested in Florida yet. A good grower.

Tuberculata.—Also imported by the United States Department of Agriculture.

Variegated.—Leaves mottled with white. An ornamental variety.

*Villa Franca**.—"At the head of the list we place this kind, imported

* Specimens from Lyman Phelps are as good as the best ever tested. (H. E. VAN DEMAN.)

from Europe; strong vigorous grower, few thorns, leaves long and pointed, very hardy; fruit oblong, thin-skinned and of superior flavor; ripens in July and August, and often has a second crop later—in November and December. The best shipping lemon we know.”—(Kedney.

Imported by General Sanford.

Waring's Seedless.—“Very early, good quality, and sometimes a whole tree will be absolutely seedless and thornless, but not perfectly reliable or thoroughly tested yet.” (J. B. Beach.)

“French,” or *“Florida Rough.”*—The variety known by this name has been grown from “time immemorial” in Florida and the West Indies. It seems to be identical with the *“Oranged lumie”* or *“Citroned orange,”* the *Citrus Aurantium Indicum, citratum Fructu mano, Cortice aureo, Crasso, Amaricante, Medulla acida et amara* of Gallesio, described as a distinct hybrid. The fruit has the shape of the orange, but with very rough, uneven skin, and a broad protuberance at the blossom end; the pulp has an agreeable acid, which, however, becomes bitter when bruised or when exposed to the air for any length of time. The pulp separates as readily from the skin as that of a Mandarin orange, and the sections are as easily divided. Its whole appearance, also that of the tree, leaves, and blossoms, correspond almost exactly with Gallesio's description.

It is a very useful fruit for home consumption, though of course it can not be shipped. The stocks are often used for the orange and lemon, which when worked upon it succeed better on many kinds of soil than on other stocks. Orange trees on this stock are as hardy as when on their own roots. The fruit can be used for cooking, and the old lemons hang on in summer almost until the young fruit is large enough to use. In the warm days of early summer the fruit is very healthy and refreshing in a raw state. It is sometimes eaten with salt, but is a real luxury prepared as follows: With a sharp knife peel off all the yellow outer skin from the freshly-picked fruit; then slice the fruit transversely, cutting thin slices, and sprinkle liberally with white sugar; eat immediately, as it will become bitter by standing. The inner rind will be found to be sweet, and with the acid pulp a delicious combination is produced.

The tree has become naturalized in some parts of south Florida, and there are hammocks containing numbers of bearing trees growing luxuriantly, surrounded by thick underbrush and forest trees. If the pulp is available for citric acid, thousands of bushels of fruit could be produced at comparatively small expense.

Variegated French is a variety with the leaves marked with creamy white.

Sicet lemon, also known as *Dulcis* or *Sweet lime*, is the *Citrus Medica Aumia* of Risso. It is not of particular value, and not much grown in Florida.

REMARKS.

The following directions for curing lemons for market are given by Kedney and Carey, extensive lemon-growers of Maitland, Orange County, Fla.:

With regard to curing them, there have been half a dozen so-called patent processes, but we treated ours as follows: Cut when two inches in diameter, pile in a heap on the floor in a dark close room, and cover with a blanket or cloth; let them remain for forty-eight hours; they will then be in a profuse sweat; wipe dry and put on shelves in single layers in a dark room, and keep them for a week or ten days until colored a pale straw-color; wrap, size and pack as oranges and ship, and you will realize highest market prices.

These gentlemen ship their main crop of lemons in July and August, and realize from \$4.50 to \$9.40 per box.

Lemon trees throughout south Florida suffered severely from the freeze of 1886, but in spite of the possibility of an occasional cold snap it is probable the lemon-growing industry will ultimately be of greater magnitude and consequence in south Florida than orange-growing.

The following plan used in curing lemons has appeared in a recent agricultural paper, the experience of Mr. R. W. Pierce, an extensive grower at Indian Springs, Orange County:

The fruit was taken from the trees on the 7th of March last, and was subjected to the following treatment: First, after picking they were dried about one hour, and then well wrapped in two sheets of common orange-wrapping paper, and then closely packed in a tight box, well lined with paper, to exclude all air; then securely nailed, and placed in an inner room which I have in my building, tight, with no windows. Care has been taken to keep the room closed so there should be no sudden change of temperature, which, from its location, would naturally be the case, as no sun can get at it at any time. They were taken from the trees perfectly green of various sizes. In six weeks to two months, they were all colored finely. At the present time I have found no damaged ones. [Letter was written in August.] All are in fine condition, and from present indications would keep for months longer.

THE LIME.

(*Citrus medica limetta*, Risso.)

The lime is perhaps the most tender of all the Citrus trees, consequently its culture is confined to a still smaller territory in Florida than the lemon. The tree succeeds in situations where an orange tree would soon die, being perfectly at home, with good culture, on the low "hard-pan" land so common in south Florida, and also growing luxuriantly on the rocky scanty soil of the keys. At present, Biscayne Bay and Key Largo probably produce more limes than any other localities in the State. The finer varieties are not known, but the common West Indian, or Florida lime, is grown in great quantities. Part of the fruit is marketed in Key West; the rest rots on the ground. People who live in countries where citrus fruits are grown, usually prefer limes to any varieties of the lemon, as possessing a stronger, pleasanter, and more

abundant acid. In consideration of these facts it is strange that limes are not more appreciated in the northern markets.

Previous to the freeze of 1886 there were hundreds of old bearing lime trees in the vicinity of Manatee, producing many bushels of fruit every year. Formerly repeated attempts were made to market them, which invariably resulted in disappointment. In many cases, it is true, they were imperfectly prepared and indifferently packed, but even in cases where the greatest care was used in sorting and putting up very little was realized from the fruit. Either limes are comparatively unknown, and for this reason unpopular at most northern markets, except New York (to which the West Indian limes are more frequently shipped), or dishonest commission merchants embraced the opportunity of "skinning the far-away Florida Crackers."

But this can not always last, for the lime is a good shipper, if properly packed in small boxes, and even then, an ordinary Florida lime contains more juice and of better quality than most lemons.

There is no reason either, except lack of capital to carry it on, why the manufacture of prepared lime-juice and citric acid might not be carried on in south Florida on the most extensive scale. Lime-juice and citric acid are both necessities all over the civilized world, and if their manufacture can be made highly profitable in the West Indies, it can also in Florida.

Lime trees above the latitude of Charlotte Harbor in most cases suffered badly at the time of the freeze, and many were killed to the ground. There are but few trees in south Florida above the keys that are set out in the regular grove form, though nearly every one has a few trees in the yard, and in the lake region the Tahiti lime is being planted in grove form in some cases. There are a few small groves around Manatee, in most cases, however, in a much neglected state. On the lower keys, especially Largo, there are many groves of lime trees, and though they bear profusely, they are neglected and left to their own devices, in consequence of which they are afflicted with all the diseases that the Citrus family is heir to. Above Charlotte Harbor there was no crop of limes to speak of, either last year or this, most of the trees having been frozen to the ground at the time of the freeze in January, 1886.

VARIETIES GROWN IN FLORIDA.

Assam.—Described as a very strong grower. Newly introduced.

Florida.—The ordinary lime cultivated in Florida and the West Indies. Known in California as the Mexican lime. Reproduces itself tolerably well from seed, and is rarely propagated by budding. Size medium to large; skin smooth and very thin; juice rich and abundant, acid and very pleasant.

Imperial.—Newly imported. Said to be first-class.

Persian.—Not tested to any extent.

Tahiti.—A strong grower, and an early and heavy bearer. Nearly

thornless; fruit almost as large as a lemon; juice abundant, acid strong. Tree spreading and handsome.

Seminole.—A new variety received from James Evans, of Fort Myers, Fla., and named by myself as above, because the seed from which the original tree came was planted by an officer during the Seminole war. Large and of excellent quality. (H. E. VAN DEMAN.)

Valentine.—Introduced through the United States Department of Agriculture.

Verevienne.—From the same source.

The following have been recently introduced from the Himalayan region:

Kaghazir, *Knatta*, *Sour Kurna* (an exceptionally strong grower); *Sour Galgal* (good grower); *Sour Jamberi*, *Sour Rangpur*, *Sour Turan*, *Sadaphal*.

CITRUS MEDICA TRIFOLIATA (Linnæus.)

(Known also as *Limonium trifoliatum*.)

"A hardy species; leaves trifoliate, evergreen; of shrubby habit; thorny; fruit of the size of a pigeon's egg; said to be sweet and edible. Very hardy and desirable as a stock for dwarfing the various varieties of oranges." (Manville.)

The *Trifoliata* is said to be hardy in mild winters as far north as the latitude of Philadelphia.* It is much used in Japan as a stock.

STRAWBERRY TREE.

(*Arbutus unedo*).

Arbutus unedo thrives exceedingly well in Florida, but is comparatively little known. It is perfectly hardy even in north Florida. Mr. E. H. Hart, at Federal Point, Putnam County, has a tree as large as a good-sized apple tree, which fruits abundantly. It is probable that the tree can be cultivated throughout all the Gulf States. There are but few trees in the South; only met with in choice collections. The following is Rhind's description:

A hardy and elegant-looking evergreen. The leaves oblong-lanceolate and serrated at the edges, the bell-shaped flowers forming a depending panicle, and the ripe berries, both of which are in profusion together in the end of autumn, render this shrub very ornamental at that season. It is a native of the south of Europe, and is also found in a wild state near Killarney, in Ireland, where it has probably been brought originally from Spain or Italy. It, however, flourishes there in a calcareous soil in greater luxuriance than is often to be met with in the woods of Italy. In both countries the fruit is eaten, and in Spain both a sugar and spirit are extracted from it. There are three varieties of the species: the red-flowered, double-flowered, and the entire-leaved.

CAROB BEAN.

(*Ceratonia siliqua*.)

The Carob bean is a tree not much better known than *Arbutus unedo*. The tree is occasionally seen, however, and more might be cultivated,

* Grows well out doors here at Washington. (VAN DEMAN.)

as it grows well and is hardy. Mr. Bidwell, at Orlando, has a good-sized young tree, as also has Maj. A. J. Adams, at Manatee, and now and then others throughout the State and along the Gulf coast westward to Louisiana. The following description of the Carob tree is from a report by Mr. Morris, of Kew Gardens, London :

This tree is extensively cultivated in countries bordering on the Mediterranean, and especially in such as suffer from periodical drought, its long roots penetrating to a great depth in search of water. It is called "Algaroba" by the Spaniards and "Karoub" by the Arabs, whence comes our English name of Carob or Caroub, the pods being called Carob pods or Carob beans, or sometimes sugar-pods. These pods contain a large quantity of agreeably-flavored mucilage and saccharine matter, and are commonly employed in the south of Europe for feeding horses, mules, pigs, etc., and occasionally, in times of scarcity, for human food. The gross export of Carob pods shipped from Cyprus during the last year (1883), according to the European Mail, was over 100,000 pounds sterling.

The Carob tree has thick, shining, pinnately-compound leaves, which are evergreen and very handsome. The foliage is rather straggling and does not make a dense shade.

C. siliqua longissima is a variety with very long pods.

LOQUAT.

(*Eriobotrya Japonica*).

(Syn. *Mespilus Japonica*, *Photinia eriobotrya*, *Photinia Japonica*.)

The Loquat has been known for many years in the South by the misnomer "Japan plum." The name "Loquat," however, is shorter and better, especially since the introduction of the many varieties of true Japanese plums. At the last meeting of the Florida Nurserymen's Association it was voted unanimously that the *Eriobotrya Japonica* be known as the Loquat, and the Kelsey Japan plum simply as the Kelsey plum, to avoid confusion.*

The Loquat has been known for many years in the South ; so long in fact that the date of its introduction can not easily be ascertained.

It is one of the most beautiful broad-leaved evergreens in cultivation; the leaves are very large, 6 or 8 inches in length, undulated, thick and shining. The tree is a native of Japan, and was introduced to Kew Gardens, London, as early as 1787. The blossoms are produced in spikes at the end of the branches in fall or winter, the fruit ripening from March to May. The fruit is yellow, plum-like, of a most delicious acid taste, and contains one or several large smooth brown seeds. The tree is very hardy, but rarely fruits above middle Georgia.

The Loquat is particularly successful in the rich lands of lower Louisiana, where it is extensively planted and is almost a sure crop. The fruit is marketed usually in strawberry-baskets, and brings fancy prices. It rarely finds its way North except to the largest markets, and then in

* It is hoped that all fruit-growers and nurserymen will conform to this wise and needful rule. (H. E. VAN DEMAN.)

very small quantities, but can usually be purchased in southern cities in the spring, particularly in New Orleans. The crop for the last two years has been light in many localities, owing to late and unusually severe frosts having killed the blossoms.

One of the largest orchards of Loquats in Florida is that of Captain James, at Jacksonville, which a few years ago was said to have brought in more cash per acre than any piece of land used for agricultural purposes in the State.

It will grow on the lower keys, but does not seem to be so much at home as on soil with a better foundation and not so subject to long droughts. A very rich moist soil is most favorable for its most perfect development, though it must be perfectly drained, as water about the roots is fatal.

The Loquat is ordinarily grown from seeds, which germinate slowly but readily if planted while fresh. It is also grown from layers and cuttings, and can be grafted on the quince or hawthorn, which are closely related trees. The trees grown in English hot-houses are usually grafted on the English hawthorn (*Crataegus Oxyacantha*). It can probably be worked also on the nearly-related trees of the genera *Pyrus*, *Crataegus*, etc., native to this country.

Mr. E. H. Hart, of Federal Point, who has long been a successful cultivator of the Loquat, tells that the improvement of this fruit by selection of seedlings is very marked. It is probable that superior varieties of the fruit will in time be produced in this way.

VARIETIES GROWN IN THE STATE.

Common.

Giant.—The Giant Loquat has not yet fruited in Florida, but H. H. Berger, of California, the well-known importer of Japanese trees, claims that it is merely the common variety grown on richer soil and under more favorable conditions.

Variegated.—Leaves beautifully variegated.

FIG.

(*Ficus Carica*.)

The fig, succeeding so well everywhere in the South, is still among the neglected fruits. It is a native of the country around the Persian Gulf, Syria, and north Africa, to the Canary Islands. Naturalized extensively in southern Europe. Fig trees are grown occasionally in temperate climates. They were brought to England, it is said, by Cardinal Cole, in 1525, during the reign of Henry the Eighth, and are still in existence, at least were recently found in the gardens of the Archbishop of Lambeth (in the open air, and 50 feet or more in height). The fig is frequently found in the open air in the gardens of southern England, and in this country the roots will occasionally live through the winter in the latitude of Chicago. However, in spite of the advocates

of fig culture in the north in the open air, the profitable and extensive culture of the fig will always be confined to more favored latitudes. It is well known all over the South. In many localities more figs are produced than can be eaten or otherwise made use of, but so far as we know, no attempts have been made yet to dry or preserve the fig for commercial purposes in Florida, except by Mr. S. B. Valls, of Saint Augustine, who several years bought up and preserved sixty bushels of figs per day during the season. Whether his venture was successful or not we do not know.

About four years ago Mr. J. K. Russell, of Olustee, started quite extensively into the business, planting out about 30 acres of fig trees, but after the trees got into bearing, and after interviewing prominent importers of the dried fruit in New York, he decided that the South could not compete in producing dried figs for commercial purposes with the fig growing countries on the Mediterranean, on account of the cheap labor employed in the production of the imported article. Mr. Russell accordingly destroyed his entire orchard. Nearly all over the South the fruit is produced in the greatest profusion wherever there are trees, and if California can make a success in preparing and marketing the dried fruit, it seems as though there was a fair prospect for the Gulf States also, where irrigation is unnecessary and all the conditions favorable for the growth of the tree. In Louisiana they grow especially well, requiring no care or cultivation, and fruiting abundantly. In the pine lands of Mississippi, Alabama, Georgia, Florida, and South Carolina they require more attention in the way of fertilizing, to produce the best results. In southern Texas, too, they succeed admirably. At Laredo and along the Rio Grande the trees are abundant; in the towns they are seen in almost every yard, and although frozen to the ground nearly every winter, they bear again the next summer. In Laredo the common large white and blue figs are the only kinds much grown, and they are sold at retail about 15 figs for 10 cents. In Florida and Georgia they sell from 5 to 20 cents per quart.

Mr. D. Redmond, of Jacksonville, Fla., is experimenting extensively with figs, and will probably make good use of the results of his experiments.

A few years ago Colonel Elliott, of Jacksonville, put a bushel or two of white figs in quart strawberry-boxes, packed them in a refrigerator, and shipped to New York. They sold at 35 cents per quart, and the dealer wrote that if he would send some choice purple figs they would sell readily at 50 cents per quart. There is little doubt but that the shipment of fresh figs could be made profitable if once this delicious fruit became popular in the northern cities.

The severe freeze of 1886 did not damage fig trees in Florida, except in the case of very young trees or the wood of older trees not well matured. In the other Gulf States the trees are frequently killed to the ground in the winter, except in the case of old trees, which are com-

paratively safe. The shoots from the roots of trees killed to the ground, however, always produce a full crop of fruit the following summer, so the loss of the old tops is not such a serious loss as it would be in the case of most fruit-trees. The Celeste is said by Mr. Redmond to be the hardiest variety of the fig.

Trees are propagated from seeds, cuttings, layers, suckers, or by grafting. The mode usually practiced in the Gulf States is from cuttings. The cuttings are made from the ripened young wood in spring, just before the buds begin to swell. If first "calloused" in damp sawdust or sphagnum, or upside down in the ground (tied in bundles) they are surer.

Fresh figs are everywhere a favorite dish for the dessert, cut, eaten with sugar and cream, like the strawberry. They are also stewed and prepared in almost every imaginable form. Miss Harcourt, in the valuable work before alluded to, gives plain directions for drying figs, also for preparing pickled figs, fig pie, fig pudding, and fig candy. They also make a delicious preserve.

Fig trees succeed best on well-drained very rich land.

VARIETIES GROWN.

But few of the following list of varieties are commonly grown in the South, and not having good opportunities for comparison, it is possible that some known under different names may prove identical or nearly so. The Florida Nurserymen's Association have taken up the matter, and after a few years it is probable that the nomenclature of the fig will be somewhat straightened out. Whether the "White Adriatic" is really one of the true figs of commerce is doubted by some, and it is probable that still choicer varieties remain to be introduced.

A tre Raccolta.

Albo Moster.

Adam.

Angelique (syn. *Early Lemon*).—"Small, greenish-yellow, early." (Berckmans.)

Auvique.

Barnisote.

Barnisotte Grise.

Bellonne.

Black Ischia.—"Medium, blue-black, good." (Berckmans.)

Black Marseilles.

Blue Ischia.—"Large, requires age to become productive; a valuable variety." (Onderdonk.)

Blue Genoa.—"Medium, bluish-black." (Berckmans.)

Biancotondo Grossissimo.

Bourjassate Blanche.

Bourjassate Noir.

Brogiotto.

*Black Italian.**Bordeaux.*—(Violette de Bordeaux.)

Brunswick (synonyms, *Madonna*, *Hanover*).—"An Italian fig, imported to Brunswick, whence the name; somewhat similar to Mission; it is a large handsome fig, rather broad at the eye; color is brownish-blue; pale on one side; fig is very large; quality fair, but deficient in flavor. This is the common blue fig in San Francisco markets." (Eisen.)

"Very large, violet, good and productive." (Berckmans.)

Bondance Precoce.—"Medium, brown; early and a great bearer." (Benson.)

Black Provence.

Brown Ischia (synonyms, *Chestnut*, *Chestnut-colored Ischia*).—"Large chestnut-brown; very sweet and excellent; very productive and hardy; a good fig; medium early." (Benson.)

Brown Turkey (synonyms, *Brown Italian*, *Lee's Perpetual*, *Howick*, *Walton*, *Brown Naples*).—"Medium, brown; very sweet and excellent; very prolific and hardy. The most reliable for open field culture." (Berckmans.)

*Black Genoa.**Castle Kennedy.**Cavaliere.*

Celestial (syn., *Sugar fig*).—"Is highly prized for table preserves and crystallizing, and will dry up and improve in saccharine matter and sweetness if left on the tree. The tree grows in all situations and thrives without care." (St. Ceran.)

Col de Signora Nera.

Commercial Smyrna.—"Probably the White Adriatic." (Van De man.)

*Concordana.**Crave.*

Col di Signora Bianco.—"Medium; green, changing to yellowish-white; flesh red and most delicious." (Benson.)

Dauphin d'Argenteuil.—"Very large and fine; early." (Benson.)

Dwarf Prolific.—"Dark purple; hardy and very fruitful." (Benson.)

*Dattero.**Della Dame.**Dellagocia.**De Constantine.**Di Corju.**Di Gerusalemme.**Di San Giovanni.**Drap D'Or,**Du Rio.**Dottato.**Early White.*

Early Violet.—"Brownish purple; very hardy and early." (Benson.)

Early Madeleine.—"Large; skin gray, flesh white; productive and fine." (Benson.)

Foundling.

Green Ischia.—"Green, with crimson pulp; very good and prolific." (Berckmans.)

Gentile.

Grosse Verte.—(Large green.)

Gourand Rouge.

Grossale.

Grosse Grise Bijere.

Hirta du Japon.

Large Purple (synonyms, *Large Blue*, *Common Blue*, *Great Blue*, *Purple*).—One of the best known in the South. Fruit very large.

Lemon.—"Very large, yellow; sweet, and prolific." (Harcourt.)

Long Brown Naples (syn., *Long Naples*).—"Fruit long, pulp red, and well flavored; seeds large."

Large White Genoa.—Probably synonymous with White Genoa.

Le Carpentier's Barcelona.—A large white fig, of delicious flavor, much grown in Bayou La Fourche, Louisiana.

Mission.—One of the early sorts introduced to California. "Small, dark purple." (Van Deman.)

Malta.—Perhaps identical with Celestial.

Madeleine.—A small white variety.

Magnolia.—"A large yellow; our most reliable fig. If killed to the ground by winter or cut down, the new shoots will bear at once, literally over-bearing. This fig will be more profitable farther north than any other. Our first choice." (Onderdonk.)

Mammoth Black.—Probably identical with Negro Largo.

Monaco Blanche.

Moscadello.

Nerii.—"Fruit rather less than the Marseilles and longer in shape; skin pale greenish-yellow; pulp similar in color to that of a pomegranate; there is in its juice a slight degree of very delicate acid, which renders it peculiarly agreeable to most palates."

Negro Largo.—"Exceedingly large; jet black, marked with ribs; very delicious." (Benson.)

Nano Bianco.

Pregussata.—"Fruit large; pulp deep red, remarkably sweet and rich; seeds unusually small." Originally from the Ionian Isles.

Pasteliere.

Prolifero.

Pacific White.—"Medium, white; very sweet; seeds small; will dry on the tree sufficiently to pack away with safety. Is of fine quality, but rather thick skin; very hardy; wood of a dark chestnut color. Foliage large and beautiful; tree vigorous and productive." (Benson.)

Purple Genoa.—"Fruit large; pulp extremely sweet and luscious."

Riproduttivo.

Rocardi.

Ronde Noir.

Rond Violet Hative.

San Pedro (syns., *Fico di San Pietro*, *Apple fig*).—"The largest and handsomest fig in existence, with excellent flavor and sweetness; skin white and thin; meat white; as a table fig this one is unequaled, and will exclude all other figs in the market. Bears early and profusely." (Eisen.)

The San Pedro fig drops badly in Florida, though perhaps on older trees this would not be the case. It has been introduced but a few years. It is one of the strongest-growing figs known.

Small blue (syn., *Little Blue*).—"Fruit below medium; pulp red, of good flavor."

Small Brown Ischia.—"Fruit small; pulp purple, of a very high flavor; leaves less divided than most other sorts."

Small Green (syn., *Little Green*).—"Fruit small; skin, green and thin; pulp red and excellent; the tree a low grower, hardy, and a very good bearer."

Small Early White.

Violette.—"Fruit small; pulp near the skin, white, interior tinged with red."

Verdino di Breanza.

White Adriatic (syn., *Verdino*).—Introduced from Sicily by way of California. We quote introducer's description: "This is a local name for one of the most celebrated figs in the world, producing the finest Smyrna figs of commerce, identical or similar to the brand known as *Erbelli*. It has been introduced into this country from south Italy, and is there esteemed the finest of all figs. The tree attains an enormous size, forming a large dense head of an umbrella-shape. The growth is very rapid. The foliage is dense; the leaves evenly lobed and glossy, of a fine lustrous, not somber, green. As a shade tree it is unsurpassed, and a finer avenue tree cannot be imagined. In growth, foliage, and color it is entirely different from any known as Smyrna. The Adriatic is equally fine for the table. It is eaten fresh, and is a most delicious fruit. The fruit is of the very finest quality; the skin is thin like tissue-paper, thinnest at the base of the fig, and not like most other figs, thicker at that point. In examining the finest dried fruit of commerce they will all be found to be split at the base, caused by the thinness of the skin. The Adriatic when dried and subjected to strong pressure in boxes acts similarly. The pulp is like a quantity of oily honey. The seeds are small. There is no hollow space in the center of the fig, but the whole fruit is the solid pulp. The size of the fruit is large—as large as any imported fig. The fruit begins to ripen in July, and figs ripen from that time continually until frost. The principal crop is in August and September. The color of the fig when dried is amber, and,

similar to imported figs, it covers itself with a fine flowery bloom. The quantity of figs produced is enormous. The branches are actually loaded down with fruit; no tree could bear more. It will bear tons of fruit when old. The tree begins to bear the year after it is planted; some trees bearing a few figs the first year. From the second year the crop continually increases." (Eisen.)

The Adriatic fig has fruited for several years in Florida. It grows vigorously, fruits freely, but there is a difference of opinion as to its quality; some place it above all other varieties, while others do not award it quite so high a place.

White Celeste.—"A small white fig, with fair flavor and sweetness. As a fruit and shade tree the White Celeste is valuable. As a fruit tree alone it has many superiors." (Eisen.)

White Genoa.—"Skin very thin; meat fine and sweet; fruit slightly smaller than the Adriatic." (Eisen.)

White Marseilles (synonyms, *Marseilles*, *Ppcock*, *Figue Blanche*).—"Fruit small; skin, pale green; flesh white, dry, sweet, and rich." Well known in the South. Very strong grower, but does not bear so early as many varieties.

White Ischia.—Probably synonymous with Yellow Ischia.

White Smyrna.—"Very large, dirty white; of good flavor; productive and hardy; not good for drying." (Benson.)

White Trojan.

Yellow Ischia (syn., *Cyprus*).—"Fruit large; skin yellow; pulp purple and well flavored; leaves large and not much divided."

As mentioned before, most of these varieties are of comparatively recent introduction, not more than half a dozen being in cultivation throughout the South. Until they are thoroughly tested and compared it will be impossible to sift out the names under which they have been imported at different times.

HOVENIA DULCIS.

This newly introduced fruit from Japan is described as follows by H. H. Berger:

A stately tree, resembling in habit the wild pear tree of Europe. The leaves are similar to those of our mulberry tree in shape and texture. The small whitish flowers appear in July. The fruit is produced by the three divisions of the inflorescence thickening and becoming fleshy. It is edible, and has a sweet and very aromatic taste, resembling much the fruit of the Carob tree; also in flavor similar to the Bergamot.

Recently introduced to Florida, and not yet tested.

MAY-APPLE, MAY-POP, OR FLESH-COLORED GRANADILLA.

(*Passiflora incarnata*.)

Our hardy native Passion-vine is occasionally cultivated in the South, but it easily becomes unmanageable by reason of its subterranean creeping root-stocks or under ground-stems. The root is perennial and

hardy over most of the United States; flowers bluish; fruit greenish or flesh-colored, with pleasantly acid pulp. Perhaps not strictly semi-tropical, but the fruit is not often seen north of Tennessee.

PRICKLY PEAR.

The Prickly-pear is the fruit of various species of *Opuntia*. The most valuable is *Opuntia Tuna*, of Mexico, West Indies, and south Florida. The plant is used in Mexico as a hedge plant, for which it is very valuable. It is said to reach an ultimate height of 20 feet, but in Florida it rarely attains a height of more than 5 or 6 feet. The flowers are purplish-yellow, followed by great quantities of purple fruit 2 inches or more in length, which is beset with minute prickles and must be carefully peeled before eating. The pulp is brilliant purple, quite juicy, and with a subacid taste. The plant is not cultivated for its fruit in Florida, but in localities where it is wild in abundance it is used quite extensively for preserves, jelly, etc., and the juice is sometimes used to give a beautiful purple color to orange jelly. The *Opuntia* is quite hardy, bearing slight freezing unharmed.

INDIAN FIG.

(*Opuntia Ficus-Indicus*.)

This cactus is a native of the West Indies, and has escaped from cultivation on the island of Key West. It is not elsewhere found wild in Florida, but is cultivated to a slight extent, both for its grand scenic effects in semi-tropical gardening and for its fruit. The species has very large joints, ovate or oblong, from which the scale-like prickles drop off when young, leaving the plant smooth and free from spines. It grows to a height of 10 feet, and produces yellow fruits, which are eaten raw or used for jellies. The fruit is sometimes shipped from the West Indies to the New York market. The Indian fig is very hardy, and has never been injured by cold in South Florida.

OLIVE.

(*Olea Europaea*.)

Olive culture in the South has made no extensive progress, and yet the indications are favorable for the further development of the industry that will doubtless be an important one.

As in the Report of the United States Department of Agriculture for 1877 there appears an exhaustive treatise on the uses and cultivation of the olive, it will only be necessary for us to state that the olive was first introduced into the southern States in 1755 by a gentleman of Charleston, S. C. Again, in 1829, Mr. Robert Chisholm, of the same State, again imported olive trees, some of which are still bearing. The Minorcan colony, that settled in Florida in 1769 also brought the olive.

There is a bearing olive orchard on Saint Simon's Island, Georgia, owned by W. R. Shadman, who reported very favorably of the results obtained there. General H. S. Sanford some years ago imported a collection of olive trees, and since then Mr. A. J. Bidwell has imported trees. Other importations have probably been made, as olive trees are not very uncommon throughout the State, and there are a few bearing trees. Young trees can be obtained from some of the nurserymen in the State home-grown, and are being planted out in numbers of instances. Mr. G. L. Taber, an enterprising nurseryman of Glen Saint Mary's, Baker County, Fla., last year propagated about 1,500 olive trees. Mr. Bidwell's trees at Orlando, which have been planted out only four or five years, produced some fruit last year, but most of it dropped off before maturing.

The olive seems well adapted to the climatic conditions and soils of all the Gulf States; it will stand ten degrees more cold than the orange tree, and can be cultivated almost anywhere in Texas, Louisiana, Mississippi, Alabama, Georgia, Florida, and South Carolina. In Louisiana the Mission and Picholine varieties are about the only kinds grown. So far as we know, the olive trees in the southern States were not injured by the severe cold wave.

VARIETIES.

The following list of varieties includes the choicest in cultivation in southern Europe, many of which have been introduced into our southern States. The varieties of the olive are very numerous in countries where it is much cultivated, as in case of any long-cultivated fruit.

For the descriptions we are indebted to various nursery catalogues and standard works on the olive:

Atroviolacea (Brunn).—Fachonille of southern France. Vigorous; oil first quality. Size large; it is preserved in France when overripe and black, and dried in the sun.

Argentata (Nevadillo Blanco; Doncel; Zorzalena; Moradillo; Ojiblanco; Olivo Lucio).—Spanish variety. Fruit broad ovate, an inch long, very blunt, not oblique. Quality and quantity of oil excellent.

Angulosa (Galliningue; Laurine).—A French variety, used for preserves.

Atrorubens (Salierne; Saverne).—French variety. Fruit dusted white. Furnishes one of the best of oils.

Atravirens (Pointue; Punchuda).—French variety. Fruit large, with good oil.

Alba (Olive Blanche; Blancane; Vierge).—A French variety. Inferior in quality.

Bellotudo (Villotuda).—Spanish variety. Fruit about an inch long; egg-shaped; pericarp outside dark red, inside violet.

Bermillaon (Vermillon).—French variety; very hardy, and yields good oil.

Bouquettier.—Yields superior oil.

Cayon (*Varal negro* ; *Alameno* ; French, *Nasies*).—A small-sized tree, which comes into bearing when three or four years old, but bears a good crop only every alternate year ; oil fine, with some aroma. Fruit violet-black, spotted, globose ovate, nearly an inch long, somewhat pointed.

Courniau (*Courniale* ; *Plant de Salon*).—Very prolific ; fruit small ; oil excellent.

Colchomuaa.—Fruit spherical, outside red, inside whitish, an inch in diameter, slightly pointed. Produced good oil in large quantity.

Carrasquena (*French Redouan de Cotignat* ; *Redouanou*).—Fruit black-red, almost spherical, about an inch long. Valuable both for oil and preserves, but liable to be attacked by various insects.

Ceratocarpa (*Cornezuelo* ; French, *Odorant* ; *Luquoise* ; *Luques*).—Fruit an inch long, oval, pointed.

Caillet Rouge (*Figanier* ; *Columbella*).—Small tree ; fruit large, red. Oil good, and produced in quantity.

Caillet Blanc.—Fruit almost white, produced annually and copiously, yielding a rather superior oil.

Cotignac (*Pardigniere*).—Fruit middle-sized ; blunt. Oil obtained in quantity and of excellent quality. Requires much pruning.

D'Ogni Mese.—An Italian variety, which ripens fruit several times in a year ; furnishes a pleasant oil. Fruit is used for preserves.

Empeltre.—Spanish variety. Fruit ovate, an inch long. Rich in oil of excellent quality ; also one of the best for pickles. Pericarp outside violet, inside whitish.

Hispalensis (*Gordal* ; *Ocal* ; *Olivo Real*).—Spanish variety. Fruit black-gray, oblique, spherical, measuring about an inch. Rather large and quick-growing tree. Fruit used in the green state for preserves ; not used for table oil.

Javaluno.—Fruit black-gray, over an inch long, egg-shaped, somewhat oblique, gradually pointed. Rich in good oil ; also useful for preserves, but much subject to attacks of insects.

Le Palma.—French variety. Oil very sweet, but not largely produced.

Macrocarpa (*Belgentier*).—Fruit large, oval. Oil inferior in quality ; used only for pickles.

Mission (*California*).—Introduced into California by the Jesuits over one hundred and sixty years ago, and some of the original trees are still standing, it is said. Oil of good quality. Fruit of medium size ; ripens late.

Mourette (*Mouraou*).—A large tree, furnishing oil of good quality.

Maxima (*Madrileno* ; *Olivo Morcal*).—A late-ripening Spanish variety, not very hardy, comparatively. Fruit over an inch long, cordate-globose, strongly pointed. Less valuable for oil than for preserves.

Niger rima (*Rapugom*).—Fine oil. Medium-sized fruit.

Nevadillo negro.—Fruit egg-shaped, fully an inch long with turned

pointed apex. One of the richest of all varieties in yield. A Spanish variety, but quite hardy, and not late in ripening.

Ojillo de Liebre (Ojo de Liebre).—Fruit nearly round; violet-black; 1 inch.

Oblonga.—Long oval fruit. Good quality of oil.

Pendulier.—Tree large, with long drooping branches. Oil first quality.

Pendulina (Boussalu).—Oil extra fine. Fruit medium size; pickled green. Perhaps identical with *Pendulier*.

Picholine (Ovalis; Lechin; Acquillo; French, Saurine).—Fruit broad oval, two-thirds of an inch long. A copious yielder. By pruning its top branches this variety is made to spread over eight yards square or more; of weeping habit; yields a good oil and fair quantity, and resists the attacks of insects well. This variety is much cultivated in Italy, is a favorite in California, is quite hardy, and is being planted out in Florida and the Gulf States more than any other variety. It is known by its name *Picholine* in Florida and Louisiana, and by this name and also as Italian olive in California.

Polymorpha (Pleureur de Garss).—Fruit large; oil good.

Præcox (Repugnier).—Medium oval fruit; oil extra.

Pomiformis (Manzanillo, or Queen Olive of Spain; French, Ampouleau).—Fruit over an inch in diameter, spherical, shining black. Putamen broad and truncate; used both for pickling and oil.

Picudo (Fetudilla).—Fruit fully an inch long, egg-shaped, blunt at the base, pointed at the apex, with black-gray pulp. Pericarp easily separable. Used both for oil and preserves.

Regalis (Sevillano; French, Pruneau de Catignac).—Fruit 1 inch in diameter, ovate spherical, blunt; bluish-black. Only for pickles; oil of third quality. Also known as *Ronde de Languedoc*.

Redondillo.—Fruit ovate-spherical, nearly an inch long. Pericarp outside bluish-black, inside whitish. A rich yielder.

Rafu (Becu).—Productive. Olives large, round; oil of good quality, freely produced.

Rubra (Caillon).—Very vigorous in its production of wood and fruit; fruit medium size; oil first quality; by some preferred to all others. The fruit, when pickled green, must be salted; can also be pickled when ripe.

Racinal (French, Bouteillan; Boutiniene; Ribien; Rapugette).—A Spanish variety, early ripening, hardy; fruit violet-colored, globose-ovate, about an inch long; neither pointed nor oblique. Bears regularly also on less fertile soil.

Rostrata (Cornicabra; French, Cournaud; Corniaud; Courgnale; Pl. de Solon; Pl. de la Fane; Cayon Rapunier; Grasse).—Strong and tall; hardy. Fruit blackish-red, over an inch long, oval, much pointed. Oil good, but fruit not so easily picked on account of the height of the tree.

Rouget (Marvailletta).—A French variety, producing fine oil.

Rubicans (Rougette).—Yield annual and large. French.

Raymet.—Fruit large, reddish. Oil copious and fine.

Uvaria (Rapugnies).—Large fruit; oil extra quality; fruit pickled green.

Varal Blanco (French, Blanquette).—Fruit ovate-globular, three fourths of an inch long, neither pointed nor oblique, outside blackish-red. A variety with low-growing branches, which enable them to be picked by hand. Yields a particularly sweet and delicate oil.

Verdego (Verdial; French, Verdai; Verdai).—Fruit black-violet, oblique, spherical, pointed, about an inch long. Furnishes good oil. One of the most hardy of all varieties; branches low-growing; fruit good for preserves.

Variegate (Marbrie; Pigale; Pigan).—Purple fruit with white spots. French variety.

DATE PALM.

(*Phoenix dactylifera*.)

There is not one date-palm tree along the southern Gulf coast and the lower Atlantic, where there ought to be a thousand. Indeed, it is almost possible to count the bearing date palms in the South on one's fingers and toes. Combining, as it does, the beautiful and the useful in such a high degree, it is strange that it has not been more planted.

The date palm is more hardy than the orange tree, enduring perfectly the climate of the Gulf coast from the Rio Grande to Cape Sable, and hardy almost as far north as some of our native palms. For many years bearing trees have flourished on some of the sea islands on the coast of Georgia, and the date palms of Saint Augustine are famous, but elsewhere throughout the South bearing trees are rarely met with. The date palm attains a great age, and is celebrated in this respect almost as much as the olive tree. It is said that "trees of from one hundred to two hundred years old continue to produce their annual crop of dates," and some of the famous "palms of Bordighera," in Italy, are known to have been planted by the monks over a thousand years ago. The date is native in north and central Africa, Arabia, and Persia. It has been long cultivated in southern Europe along the Mediterranean, and grows even in the south of France, though in that high latitude rarely fruits.

The town of Elche, in Spain, is surrounded by an old date forest of 80,000 trees, and the sale of the fruit and the leaves for decorative purposes constitutes the principal income of the town. At Alicante there are also immense planted forests of the date palm. There is nothing to hinder the formation of such extensive forests of the date palm in Florida and the lower South—nothing except modern American impatience, which can rarely wait patiently even for a budded orange tree to come into bearing. The date palm is propagated both from seeds and by suckers from the roots. The superior varieties can only be increased

with certainty in the last mentioned way. The age necessary to be attained before coming into bearing varies greatly according to soil, climate, variety, and other circumstances often unexplainable. Trees have been known to bear in this State when only four years old from the seed, but this is the exception, as they rarely blossom under ten years of age, and often perfectly healthy trees are said not to produce fruit before they are fifteen to twenty-five years old. When root suckers or offshoots are planted they are said to commence bearing in five or six years.

The date palm, as is well known, is pinnate-leaved; leaves bluish-green and very beautiful. The tree, with great age, attains a height of 80 feet, but its growth is exceedingly slow. In Florida there are large trees, some of them fruiting in Jacksonville, Saint Augustine, Tampa, Manatee, Key West, on Key Largo, lower Matacombe, and at other points in the State. The number of young plants being put out at present is quite considerable, it not being uncommon for one person to plant out 25 to 100. Occasionally an avenue of dates is planted, destined to become not only a "thing of beauty" but almost "a joy forever."

Though the date grows very slow, it is but a few years after planting in fertile soil until it becomes a grand ornamental plant, which fact should altogether atone for its slowness in fruiting.

The seeds should either be planted where the trees are to stand, or else cultivated in pots for a few years before planting out. The palm can, of course, be transplanted from the open ground, but usually recovers slowly after this operation, and much time is lost. The best way is to cultivate in pots for a few years, in very rich soil, shifting as often as becomes necessary, and giving slight protection from sharp frosts, and when finally planted out it can be done in the spring, thus giving the plant a chance to become thoroughly established in the ground before winter, and better able to cope with cold weather. Even the young plants, however, are rarely seriously injured by cold below Jacksonville.

The offshoots can be taken off as soon as they begin to form roots for themselves, deprived of leaves, and kept moist and shaded for a few months. They will rarely grow much, however, inside of a year.

On Snead's Island, at the mouth of the Manatee River, a few years ago, stood two date palms, male and female, about 30 feet in height, whose history (although Manatee has been settled about forty-five years) was completely unknown. They were thought to have been planted by the Spaniards or freebooters who frequented the coasts many years ago, before any settlement existed on the west coast. The female tree bore full crops of fruit every year until about four years ago, when a would-be sportsman, in trying to cut off the clusters of fruit with a rifle-ball, shot through the bud of the palm and killed it. In some parts

of the world it is a criminal act to willfully destroy the date tree, and the enactment of a similar law is worthy of consideration by Floridians.

On lower Matacombe Key are two very large date palms, the time of whose planting is unknown to the present inhabitants of the keys, but which were undoubtedly planted by Dr. Perrine over fifty years ago, when he lived there and worked to introduce useful tropical and semi-tropical plants into the United States—(efforts nearly forgotten and but little appreciated by Floridians of to-day, but not without great results, not the least of which was the naturalization on the coast of Florida of *Agave Sisalana*, the true Sisal hemp, undoubtedly destined to become as great a source of wealth to Florida, when once capital and attention shall have been turned towards it, as to her fruit interests). Dr. Perrine perished in the historical massacre of Indian Key, but previous to his death, during his one or two years' residence on the keys, he had introduced hundreds of rare and useful plants, many that have not been again introduced. Most of these perished during the neglect of years—fire, war, and vandals having done their work; but at least three important plants remain monuments to Dr. Perrine's memory, striking examples of the survival of the fittest—*Agave Sisalana*, *Aloe vulgaris*, and *Phoenix dactylifera*.

Mrs. Hester P. Walker, the only surviving daughter of Dr. Perrine, now living in Fernandina, Fla., tells us that at one time her father bought a sack of dates and distributed them, on the sole condition that the seeds should be saved and returned to him, and that he afterwards planted them in many places.

The two date palms are now the property of Key West parties, and a young cocoa-nut plantation surrounds them. The bases of the trunks are surrounded by an impenetrable *chevaux-de-frise* of the suckers, forming a mass of leaves 20 feet across and hundreds in number.

The following description of the preparation of dates for market, etc. is from Whitner's Gardening in Florida:

Large vats, holding about one ton each, are gradually filled with fruit, which is trodden down by men and women, water being added from time to time to soften the fruit. The surplus sirup or juice is then drained off to be used for culinary purposes, as molasses, etc., the residue being made into large cakes, which are covered with matting, and shipped to the various markets of the world. Fermented date fruit makes a palatable wine; so also does the sap or juice of the tree, which is obtained by tapping, as in making sugar from the maple. Date sap is likewise converted into sugar by the usual process of evaporation. The tree is tapped a little below the lower leaves of the crown. A full grown tree it is estimated will yield 2 gallons of sap a day for three months, commencing the first of November.

It is said that in Egypt a yield of 400 pounds of fruit has been harvested frequently from one tree in a single season.

At Mr. Samuel Johnson's plantation, on Key Largo, are half a dozen fine young date palms, one of which, now seven years old, we saw with three large clusters of fruit on it in June. And Mr. Johnson told us that it had borne fruit four years, commencing when the tree was three years old.

All authorities unite in declaring that the date palm is diœcious ; and so it seems to be usually, but we think that now and then a specimen must have perfect blossoms ; for Mr. Storter, at Chuckaluskee Bay, south Florida, has a fine young date palm, with no other blooming trees within miles of it, which last year produced fruit when only five years old.

It is stated that to produce the best results the blossoms of the male tree are shaken over those of the female ; but is it not possible that this operation may really be as useless as the "caprification" of the fig in the East? It is stated that one male tree is sufficient for fifty females.

VARIETIES.

The varieties of the date palm are said to amount to nearly a hundred in the East, where they are much grown. In Florida but little attention has been paid to varieties, though two or three importations of named trees have been made. Most of the following sorts are growing in Florida, and perhaps others :

Assonad.

Bussorah.

Black (syn., *Goliath*).—The ordinary date of commerce.

Gomera.—Fruit large and seedless.

Menchick.

Ribon.

White African.

Yellow Rosetta.—"Preserved in layers like Muscat raisins, it is sold at a high price in London and Paris, and also in the principal American cities under the name of Sugar dates." (Whitner.)

Zadie.—This variety produces the heaviest crops, it is said ; often 300 pounds to the tree.

OTHER SPECIES PRODUCING EDIBLE DATE FRUIT.

Phœnix farinifera, Roxburgh (*Phœnix pusilla*, Gaertner).—A very hardy species, native of India and south China. Berry described as "shining black, with a sweet mealy pulp." Is said to prefer the vicinity of the sea. A dwarf species.

Phœnix reclinata, Jacquin.—Prior to the freeze of 1886 I saw magnificent young specimens of this popular decorative palm at General Sanford's "Belair Grove," at Sanford, but have not seen them since, and do not know how they came through the freeze. Very small specimens at Manatee were apparently killed by this freeze—even the bud leaf pulling out easily—but with the approach of warm weather they completely recovered. This palm is a native of south Africa, particularly Natal, and produces edible berries. Not a tall palm.

Phnæix Sylvestus, Roxburgh.—The Wild date of India. A magnificent tree, very hardy, and much esteemed in India for the palm sugar

which is made from it. It is said that 50,000 tons of palm sugar are produced annually in Bengal alone from this and some other palms. The palm is not sacrificed by the process, but can be used in this manner for fifty years. Berries yellowish or red.

Phoenix Spinosa, Thonning.—A native of tropical Africa, but said to ascend to considerable elevations. It is said that the green bunches, if immersed in water for half a day, suddenly become of a scarlet color, and the astringent pulp becomes edible and sweet.

Nearly all the palms of the extensive genus *Phoenix* are hardy in Florida, and succeed better than any other class of pinnate-leaved palms. It is remarkable that some, though natives of countries directly under the equator, are among the most hardy sorts. Nearly every edible species of *Phoenix*, and the best collection of hardy palms in Florida, can be seen in the grounds of Mr. E. H. Hart, at Federal Point, Fla., many of them very large specimens. Mr. Theodore L. Mead, at Oviedo, also has a fine collection.

Isolated specimens of the date palm are occasionally seen along the Gulf coast in the parishes of Terre Bonne, Saint Mary, Cameron, and Plaquemines, La., but they are not commonly planted yet, nor are they anywhere in the Gulf States.

POMEGRANATE.

(*Punica granatum*.)

In the Florida Dispatch for August 29, 1887, appeared an essay on the pomegranate, read before the Florida Nurserymen's Association at Palatka, August 9, 1887, by Mr. D. Redmond, of Jacksonville, that is throughout so interesting, and so well describes this much-neglected fruit, that we can not refrain from copying parts of it; describing, as it does, the pomegranate in so much better words than any I could use. Mr. Redmond says:

The pomegranate, which Downing characterizes as "unique" among fruits, and pronounces "the most singularly beautiful one that ever appeared at the desert," is a native of western Asia, but has long been cultivated in southern Europe, the East and West Indies, and North and South America. Like the fig, it can claim a place in the very earliest annals of the world, and was used in the time of Solomon as a pattern for embroidering the costly garments of princes and to embellish the most ornate and splendid architecture. Before the peach, the nectarine, and the apricot had traveled from Persia to the more western countries on the borders of the Red Sea, the pomegranate was there assiduously cultivated and held in the greatest esteem. In the wilderness, when the children of Israel murmured for the fruits of Egypt, they exclaimed, "It is no place of seed, or of figs, or of vines, or of pomegranates." On the borders of the promised land, Moses described it as "a land of wheat and barley and vines and fig trees and pomegranates; a land of olive-oil and honey." In the Canticles, Solomon speaks of an orchard of pomegranates with pleasant fruits." Throughout other parts of the Bible also we find many pleasant allusions to the pomegranate; and heathen mythology has furnished us with a very beautiful legend respecting this fruit, which is thus told by Bapin, the French poet: "Bacchus once beguiled a lovely Scythian girl, whose head had been previously turned by the diviners having

prophesied that she would some day wear the crown, and who therefore lent a willing ear to his snit. The fickle god, however, not long after, abandoned her, when she soon died of grief. Touched at last, he then metamorphosed her into a pomegranate tree, and placed on the summit of its fruit the crown (calyx), which he had denied to his mistress while living." A tree, therefore, which partakes of the antiquity of the fig, the vine, and the olive, and which in point of utility is numbered with the grain-bearing plants and with honey, all constituting the principal food of the nations of antiquity in their early stages of civilization, should possess for us no little interest, and is surely worthy of our especial attention.

Like the fig, the pomegranate is readily propagated by layers, cuttings, and seed. It is quite hardy in all of the Gulf States and even farther north; it is an early and very prolific bearer; very graceful as a large shrub or tree in form and foliage; and produces a great profusion of strikingly brilliant and lovely scarlet flowers.

The pomegranate is well known to most residents of Florida and the South, and very highly admired and esteemed by many, and yet must be classed with the fig among the too-much neglected fruits. A few words as to its uses and prospective value may therefore be appropriate.

The sweet pomegranate, when in perfection, possesses a fresh crispness, delicacy, and sprightliness of flavor almost unrivaled among fruits, and is considered a great luxury by all who obtain it; but with us, unfortunately, the season is very short, and the fruit quite perishable. In Rhind's Vegetable Kingdom we are told that the ripe fruit of the pomegranate is in great abundance in August at Aleppo, and that it is then "laid up for the winter stock." [I must remark here that, so far as I know, this art of keeping the ripe pomegranate a considerable length of time does not seem to be known among us, though such knowledge is very desirable.] In Syria the sweet pomegranate is cut open, the seeds taken out, stewed with sugar, sprinkled with rose-water, and served on little plates. An infusion of the crushed seeds in cool sweetened water is often used in the sick-room; and a very delicate wine was extracted from these fruits by the ancient Jews, as may be inferred from the words, "Grath Rimmou," signifying the press of pomegranates. The pulp-enveloped seeds are often used in the manufacture of jellies, preserves, and sirups; the rind of the fruit is used in medicine as a tonic and an astringent, and the bark of the tree produces the dye which imparts its peculiar color to the morocco leathers of commerce. The pomegranate thus combines the *utile cum dulce* in a very great degree, and has no rival whatever as an ornamental and decorative fruit.

Downing said of the pomegranate, more than thirty years ago, that "it deserves to be much more popular than it now is in every southern garden; and if raised in large quantities here it would become a valuable fruit for sending to northern cities, as it is now constantly sent from the south of Europe to Paris and London."

In confirmation of Mr. Downing's opinion, I may say that I shipped an average lot of pomegranates, well packed, to New York some years ago, and received for them more than the common price of oranges. I know this beautiful and fine fruit can be abundantly raised in all parts of Florida. I believe that a large demand for it can be easily created both North and South by a good article supplied in abundance; and I commend the improvement, fuller development, and increased culture of both the fig and pomegranate to the special attention of this practical and progressive association.

The pomegranate is perhaps more grown in Louisiana and southern Texas than in other parts of the South. In Onachita Parish, La., sweet pomegranates were badly killed back by the freeze of 1886, while the common sour variety was not injured in the least. We have noticed also here at Manatee, Fla., that the small sour trees in the nursery were much more hardy than the sweet ones, for although, as Mr. Redmond says, the pomegranate is usually hardy all over the South, at this com-

paratively low latitude they usually keep growing briskly all winter, and when a "norther" occurs, followed by a severe freeze like that of 1886, even the young pomegranates are sometimes injured; more so, evidently, than if their rampant growth had been checked by cool weather in the fall. The pomegranates of northern Mexico and southern Texas, along the Rio Grande, are acknowledged to be superior to most of those grown in the South by all who have eaten them. Finer varieties have probably been produced here by selection of seedlings, as the pomegranate there would naturally afford more opportunities for the selection of the best sorts. In Laredo, Tex., nearly every yard has a few trees in it, and the fruit retails at fruit stands for 5 cents apiece, and "very sweet and of the largest size." In Louisiana it is cultivated quite extensively for home use, though usually given away, and rarely sold in the market, except in New Orleans and a few other large places. Little orchards of several dozen trees are here in Florida no uncommon sight; and the new and superior sorts are receiving much attention.

VARIETIES.

Alba plena.—Only ornamental. Flowers double, white.

Caribbean Coral.—"This handsome and attractive sort, recently introduced from the country bordering the Caribbean Sea, bids fair to eclipse anything of the kind ever grown here. Medium to large, yellow, beautifully covered with crimson flush; the skin, while thick, is of a soft leathery texture, classing it among soft-shells, and rendering it a splendid shipper; meat pink and aromatic in flavor; ripens in June." (St. Ceran.)

Early Red.—Recently brought to notice by Mr. R. D. Hoyt, of Bay View, Fla. Very early, ripening in August.

Hermosilla.—Introduced from Hermosillo, Mexico, via California. Described as an excellent variety.

Large Green.—Also introduced to public notice by Mr. R. D. Hoyt; not yet tested elsewhere than at Bay View, Fla.

Legrelliae.—Only ornamental. Flowers reddish-yellow, bordered with white. Double.

James Vick.—Only ornamental.

Nana.—Dwarf. Only planted as an ornamental shrub.

Paper-Shell.—"An extraordinary new variety of very fine quality, with a thin skin, hence the name; the membrane separating the pulp is also very thin, like tissue-paper. For home consumption this variety will be highly valuable; tree a good bearer, but more dwarf than the Spanish Ruby." (Eisen.)

Prolifera.—Only ornamental. A shoot proceeds from the middle of the flower.

Red Saharaupur.—Recently introduced from India. Not yet fruited in Florida.

Rubra plena.—Only ornamental. Flowers double, red.

Spanish Ruby.—"Fruit very large, as large as the largest apple; eye very small; skin thick, pale yellow, with crimson cheek; meat of the most magnificent crimson color, highly aromatic and very sweet. Of all the fruits we ever tasted in our temperate climate the Spanish Ruby pomegranate and the Adriatic fig are the two finest. This pomegranate is simply magnificent, and people who never before did like the pomegranate have praised this fruit as unequalled. The Spanish Ruby is a fine grower and a good bearer; the fruit is a good shipper, and ripens shortly before Christmas-time. It could be laid down in New York during the holidays, and would there attract great attention. This fruit will prove one of our coming export fruits." (Eisen.)

Sour (common).—The most hardy variety. Fruit used in compounding a cooling drink; fruit large and handsome.

Sweet (common).—Fruit pleasantly flavored; commonly grown.

Subacid (common).—One of the kinds in general cultivation.

White Saharaupur.—Recently introduced from India. Not yet fruiting in Florida.

Yellow-flowered.—Ornamental.

There are other ornamental sorts in cultivation, and magnificent Arabian and Indian sorts are described. Mr. Redmond mentioned and described in his essay the following sorts:

Shami.—"Almost stoneless, deliciously perfumed, and as large as an infant's head."

Turki.—"Large, and of a white color."

Caul seedless.—Described as seedless, and as large as a human head.

JUJUBE.

(*Zizyphus*.)*

The Jujubes are thorny shrubs or small trees, much cultivated in China and the East, where many superior varieties are grown, differing in shape, color, and size of the fruit.

The spines are long and straight, and the leaves sometimes furnished with one or two thorny stipules. Jujube trees are hardy in the Gulf States, though very rarely met with. The cold of January, 1886, did not injure large trees in Ouachita Parish, La., in the least. They bear regular and heavy crops of fruit, scarlet, about an inch long, and good taste and flavor. They are used extensively as hedge plants in the south of Europe.

The fruit of *Z. vulgaris* resembles a date, but the tree is of the natural family *Rhamnaceæ*, with simple leaves of the size of apple leaves.

SPECIES PRODUCING THE JUJUBE FRUIT.

Z. Jujuba.—Native of tropical Africa, East Australia, China, and India; in India ascending the Himalayas to 4,500 feet. Cultivated

* Here at Washington some species of this genus live in the open air and bear well. (H. E. VAN DEMAN.)

much in China, and occasionally in the West Indies. Described as an excellent dessert fruit, red or yellow, the size of a cherry. The Tussa silk-worm, the most important of the wild silk-worms of India, feeds on the leaves of this tree.

Z. vulgaris.—The species cultivated in the South, but seldom seen. A native of the East, particularly Syria. Fruits about an inch long, scarlet, and known as "South European jujubes."

The following species not yet introduced so far as we know :

Z. Joazeiro.—Native of Brazil.

Z. Lotus (the true lotus).—Much cultivated in the countries around the Mediterranean Sea. Used for hedges about Genoa and Nice and in other parts of southern Europe. The fruit is prepared as a dry sweetmeat in Italy. Fruit small.

Z. Mistal.—Native of Argentina.

Z. nummularia.—A closely-related species, from the mountains of India. Fruit of excellent flavor, and shrub often used for hedges.

Z. oxyphylla.—Said to have a very acid fruit.

Z. rugosa.—Native of Nepal and other mountainous parts of India. Said to be very hardy. A small tree.

Z. Sinensis.—A species similar to *Z. rugosa*; a native of Japan and China.

Z. Spina Christi.—Found in middle and north Africa and southwest Asia. Often used for hedges. This shrub is supposed by some to have furnished the crown of thorns placed on the Saviour's head.

KAKI, OR JAPAN PERSIMMON.

(*Diospyros kaki*.)

The Japan persimmon, though it can not strictly be classed with semi tropical fruits,* is more at home in the Gulf States than elsewhere in the United States. It has taken its place with the standard fruits of the South, and is a favorite with many. It is never affected by cold in the lower southern States, and is one of the most handsome of fruit trees. It can be worked on either imported or native stocks; and budded or grafted. The imported stocks are not so much in favor as the native persimmon (*Diospyros Virginiana*). The native tree is more vigorous, and makes a larger tree. Root-grafting, top-grafting, and budding are all practiced in working the persimmon, and each method has its advocates. Trees seem to be equally healthy worked in either way.

The fruit ripens from August to November, and retails throughout the South, according to locality and variety, at from 10 to 75 cents per dozen, sometimes higher.

Mr. P. J. Berckmans, the well-known pomologist of Augusta, Ga., says of the Japan persimmon in his valuable catalogue :

The merits of this fruit are the early bearing age of the trees as well as wonderful fertility, as it is quite common to see one-year-old trees planted in spring produce a

* Owing to the fact that it is fully as tender as the fig, I think it properly semi-tropical. (H. E. VAN DEMAN.)

crop of from twenty to fifty well-developed persimmons the following year. The tendency to overbearing should be checked by removing the largest proportion of its fruit when fully set, in April or May, and leaving only a number commensurate with the age and size of the tree. The fruit of most varieties is of a bright orange red or light vermilion color, in shape and general appearance resembling a large smooth tomato, and begins to color when half grown, but should be allowed to hang on the tree until just before a frost is expected or, in the case of the early ripening varieties, when fully soft. If gathered before a frost there is a slight astringency next to the skin in most varieties, but this disappears after being kept in the house a few days or weeks. If allowed to be slightly touched by frost the flavor is much improved, but the fruit will then not keep many days. It is therefore desirable to gather the fruit before frost, if intended for keeping, and then some varieties will remain sound until January or February. The flesh is soft, rich, and sweet, and has a slight apricot flavor.

There are many varieties of the persimmon raised in Japan; some are eaten in a fresh state, others are used for drying. Samples of dried persimmons have been sent from Japan, and they are equal to the best Smyrna figs, but with a peculiar and pleasant aroma.

We have endeavored to arrive at a correct nomenclature, but after seven years in fruiting the persimmon we are as much puzzled now as at the start. Large quantities of the trees are annually imported from Japan; the varieties seldom exceed twelve in the collections usually sent to this country, yet when the trees bear fruit the same name is often found to apply to several distinct varieties, or one variety has several names."

The only insect enemy of the persimmon that we have thought formidable is the twig-girdler (*Oucideras cingulatus*, Say). The best way to eradicate this insect is to burn all branches and twigs that have been girdled by it, as the eggs of the next year's generation are contained in these twigs. A notice and description of this insect and its habits may be found in the report of the entomologist for the year 1871, page 72, of the Report of the United States Department of Agriculture, and probably in other later reports. In some localities the destruction wrought by this beetle has been so great as to deter parties from planting the persimmon to any extent.

The ultimate market value of the Japan persimmon is yet uncertain, but it is probable that in time it will be found to pay the best if dried or evaporated, and marketed in the manner that dates, figs, and raisins are disposed of. We are not aware that any attempts have yet been made to market the persimmon in this manner in the United States.

VARIETIES.*

There is so much confusion existing as to the names of the varieties that a list and descriptions are not given.

In addition to the fruits already described, there are many varieties of native and imported plums, cherries, peaches (especially of the Chinese strain), quinces, apples, grapes, pears, blackberries, strawberries, mulberries, and even raspberries, that are eminently adapted to

* The reader is referred to my remarks and descriptions beginning on page 6 of this report. (H. E. VANDEMAN.)

culture in the South, and apricots, nectarines, almonds, chestnuts, pecans, Caucasian and Chinese walnuts (often improperly called English), filberts, European medlars, *Pyrus Maulei*, and other fruits are grown with varying degrees of success in different localities, but as these are fruits of the warm temperate zone, their discussion does not come within the limits of this report.

Very respectfully,

P. W. REASONER.

MANATEE, FLA., *September 10, 1887.*

HON. NORMAN J. COLMAN,
Commissioner of Agriculture.

TROPICAL AND SEMI-TROPICAL FRUITS OF CALIFORNIA, ARIZONA, AND NEW MEXICO.

BERKELEY, CAL., October 15, 1887.

DEAR SIR: I hereby submit a report on the condition of tropical and semi-tropical fruits of California, Arizona, and New Mexico.

Yours, most respectfully,

W. G. KLEE.

Hon. NORMAN J. COLMAN,
Commissioner of Agriculture.

CITRUS FRUITS, ORANGE, LEMON, LIME, ETC.

THE ORANGE.

The orange (*Citrus aurantium*) is doubtless the hardiest of the edible members of the Citrus family. The lowest temperature the orange tree will endure, without suffering any serious injury, depends somewhat upon the condition of the growth of a tree. Under favorable circumstances, when comparatively dormant, it may escape serious injury even when exposed to as low a temperature as 21° F. The stock chosen to graft upon undoubtedly governs the hardiness, and we are led to believe from personal observation that the Japanese Mandarin orange, when grafted on the deciduous species (*Limonium trifoliata*) will easily endure this temperature, and perhaps even lower. While, however, the tree may escape unharmed, it must be remembered that the fruit will not endure such a low degree, and should a temperature of 26° prevail for many hours, it would be utterly worthless.

The planting of the orange in the northern and central part of the State, as a commercial enterprise, does not date back many years, and even in those counties that claim to be well adapted for orange-growing the plantations are comparatively scant and must still be regarded in the experimental stage. Enough data, however, are at hand to show that with judicious selection of sites, especially in the so-called thermal belt, orange-growing can be made a success. These thermal belts are found skirting our coast valleys, and also the larger valleys at a slight elevation from a hundred to a thousand feet or more, depending upon

the configuration of the mountains. There are instances of orange trees having produced fruit in a latitude even as high as Shasta County. There are several trees successfully growing there, one of them in its thirteenth year, and producing this season over 500 oranges. The soil in which this tree is growing is extremely shallow.

CENTRAL AND NORTHERN COAST REGION OF CALIFORNIA.

Scattered in the gardens of the city of Oakland we find some orange trees, planted chiefly for ornament, but the climate being comparatively cool, the fruit produced is inferior and late in ripening. In the town of Alameda several trees are on record as having produced fair fruit.

In the foot-hills skirting San Francisco Bay, sheltered warm nooks will produce oranges of fair quality.

In San Mateo County we have seen both seedling and budded oranges, an example of the latter being a tree three years old, producing well-flavored oranges.

In Santa Clara County we find trees producing fair fruit, but no serious attention has yet been given to the matter. In the foot-hills on the west side of the valley, especially in the vicinity of Los Gatos, a number of trees are growing. Mr. C. H. Wilcox's orchard deserves special mention, as it proves what can be done in this region.

Mr. Wilcox has kindly furnished me with the following information:

The oldest orange trees on the Jesuit fathers' place here have been planted six years; they have been budded and cut back this summer. A few budded trees set five years ago commenced to fruit the second year after being planted (some of the seedlings the fourth year; they were bought for three to five years old). The first planted trees are from 10 to 16 inches in circumference. Except on a few rocky points none of the trees have ever been irrigated, nor have they ever been protected from frost. I have raised seedling oranges in the open air nearly every year, and never had one frozen. I consider what I bought for Konah the best, having very thin skin and being very juicy, hanging on the tree till the present month (September). The next best I consider St. Michaels, and the two varieties of Navels. The Mediterranean Sweets are generally poor, except some few trees in dry places. Wherever the land is rich the fruit is coarse. I prefer the oranges from irrigated trees.

The place referred to by Mr. Wilcox was formerly owned by him, and is located about 100 feet above the town of Los Gatos, on rolling land. The soil is a deep red gravelly loam, on which all kinds of deciduous trees flourish. The orchard was visited by the writer two years ago, and was then in fine order, the trees showing sign of but little black-scale. We have referred particularly to this orchard, as it is the largest one in the section where growing oranges without watering has been attempted.

In Sonoma Valley, there is to be found a number of small groves of orange trees producing good and merchantable fruit. Of these, the oldest belongs to General Vallejo; from another, of Mr. N. Carrigen, a crop is regularly obtained and marketed. Both these orchards are on sloping ground near the hills. About Healdsburg and Cloverdale, in Napa

Valley, and in the hills bordering the valley, oranges in many sheltered nooks have done well.

The following information comes from Mr. George Beach, of Saint Helena :

My oldest orange trees are thirteen years old, in bearing four to five years. I have several eleven years old, in bearing two to three years. The fruit is large, juicy, but with thick rind. These are all seedlings, but bear heavy crops. We begin to pick them in the middle of December, but they are best in February until the first of May, when they lose rapidly in quality. Besides these older trees I have a number of younger trees of budded varieties of all ages.

The writer saw a number of orange trees about Saint Helena, but Mr. Beach's are amongst the best cared for. The trees are all irrigated. Some soft orange-scab is found, but the trees are pretty bright.

The character of the oranges grown in the coast region within the reach of frequent fog partakes naturally of that of the coast region of the southern counties.

When not especially cared for the trees are affected by scale, and a subsequent fungus gives both fruit and foliage a smutty appearance. When scale is not present, no difference is noticeable between the coast and interior fruit, except the former may be of a somewhat paler color. As we proceed inland away from the fogs the black-scale becomes less and less noticeable, and finally, where fogs are not prevalent, it disappears altogether.

SOIL.

The soil considered to be best adapted to the successful growth of the orange is principally a sandy loam, because such a soil is less subject to being baked by repeated irrigation and cultivation. But there can be seen well-grown orange trees in various parts of the State on a great variety of soils, including the black heavy soil known by the name of black adobe, but the latter must be considered unfavorable on account of the difficulty in irrigating it.

IRRIGATION.

This is, with the exception of a few cases, practiced generally, and must be considered necessary to bearing trees; the amount necessary must naturally vary according to rain-fall of the section as well as of the soil.

VARIETIES.

The best authorities on orange culture in southern California agree pretty well that there are four varieties which are likely to be the leading ones for some time; of these the *Washington Navel* is generally placed first, and is well described and figured in the last Report of the U. S. Department of Agriculture. It is one of the earliest to ripen here.

Mediterranean Sweet.—Imported by chance from England by Elwanger & Barry, of Rochester, N. Y., as a shaddock, but proving a good orange instead, was propagated by A. T. Garey, of Los Angeles; is of

oval shape, rather thick-skinned, sweet, pale-colored, ripens late ; almost thornless.

Maltese Blood.—Introduced from abroad, a round smooth fruit, a little undersized, when fully ripe only developing the characteristic color of pulp ; has brought nearly the same price in market as the Navel ; is a very juicy but rather acid orange.

Paper-rind Saint Michael.—A small very thin-skinned orange of fair quality, pale-colored.

Valentia Late.—A variety which keeps till June in good condition, hence has proved valuable when raised in limited quantities.

Mandarin and Tangierine.—These two Japanese or Chinese varieties are grown to some extent on account of their early ripening ; and prove profitable. Mr. A. B. Chapman, of San Gabriel, who has one of the largest groves of the latter variety, considers it his best-paying orange. To the Japanese family the "*King*" of Cochin-China belongs ; it has fruited, and is being propagated by the firm of Twogood & Cutter, of Riverside. It is an exceedingly juicy and pleasant orange, with a rough skin, ripening late. Tree very thorny.

There are, besides the few varieties named, quite a number cultivated, but the general verdict seems to be that none of them have proved sufficiently profitable to justify their propagation by budding, and when the first-named varieties are not used, seedlings from Tahiti seed are grown and allowed to bear. The seedlings are generally very vigorous growers, but require ten to twelve years to reach good bearing age, while budded varieties reach this in half the time. The budded varieties all more or less show a tendency to overbear, hence the trees become half dwarf. This tendency can be counteracted by budding on large six or seven year old seedlings, inserting the buds in the limbs. This fact has been demonstrated clearly by Mr. Cutter, of Riverside, in case of the Washington Navel.

PRUNING.

Want of space does not permit entering into any discussion of the details of pruning. There are two chief systems practiced—low and high pruning. The first has its strong advocates, claiming that a much larger quantity of fruit is produced earlier. We think there is much in favor of this argument. On the other hand, the objection of more difficult cultivation is raised, but this can be remedied by differently-constructed implements. The high pruning allows about 4 feet of a trunk, while the low gives hardly any.

GRAFTING STOCK.

There are growing in the State orange trees on at least five kinds of stock—China lemon, common lemon, sweet orange, sour orange, and three-leaved orange (*Limonium trifoliata*). The China lemon was in the beginning propagated much because it grew from cuttings ; it is now

entirely condemned, the trees having proved short lived and subject to gum disease. Lemon is subject to the latter objection, although in a much less degree. The sweet orange is raised from seeds from the Pacific islands and is the stock most tried, and on it are all the finest orchards. The late scarcity of stock has led to the importation of sour-orange stock from Florida, and the stock wherever tried seems well adapted to the climate and soil, being very vigorous and healthy. Lately the Japanese oranges are being introduced and planted; the stock in this case is the shrub *Limonium trifoliata*, a deciduous species with three-lobed leaves. It is essentially a dwarf stock and quite hardy.

CENTRAL AND NORTHERN INTERIOR.

We have referred to the orange trees grown in Shasta County. This is in all likelihood the most northern county in the State in which oranges may be successfully grown, and locations adapted are therefore necessarily restricted.

During the last Citrus fair, Tehama County showed oranges which compared very favorably with others grown in adjoining counties.

At Bidwell's Bar, the former capital of Butte County, is found an orange tree which was planted in 1859, and although having been left to itself, it is still doing well. The soil is naturally rich. The tree is about 25 feet high, about 16 inches in diameter of trunk, and is said to have produced in a single season 3,000 oranges. This is probably the highest elevation at which orange-growing in Butte County has been attempted.

In the town of Oroville is to be found a number of large orange trees, some of them over 25 feet high, and this in spite of having been planted altogether too closely. They receive plenty of water and develop rapidly. Nearly all the older trees are seedlings. But lately a number of young trees, all of budded varieties, have been planted. Across the Feather River, on the table-land, about 80 or 100 feet above the river, the Oroville Citrus colony has undertaken the planting of large orchards. The soil is red, gravelly, of varying depth, in places quite shallow. The forty acres planted two years ago are doing remarkably well. They are mostly of the Washington Navel variety. No older trees exist in the colony, but on a knoll on which the county infirmary stands there are over 20 nine-year old trees, all seedlings. The largest of these is about 20 feet high, with a crown diameter of about 15 feet. The trees are loaded with fruit, and show no signs of ever having been injured by frost. Altogether about 200 trees are found here, varying in age from nine years to two. They receive plentiful irrigation. In other parts of Butte County orange trees are met with, *e. g.*, at Chico and at Biggs, but have been regarded more as ornamental trees.

YUBA COUNTY.

In nearly all the gardens of any size in the town of Marysville, as well as the adjoining town of Yuba City, in Sutter County, one may meet with

oranges and lemons. The soil here is sedimentary, and the oranges when well cared for develop rapidly. A lady of Marysville received the medal for the best exhibit of citrus fruits at the Sacramento fair in 1886.

PLACER COUNTY.

On the rolling hills of Placer County, at an elevation of 500 to 1,200 feet, there is scattered a number of small orchards of orange trees. In many instances these trees are small and stunted, having been allowed to overbear, but when well cared for even in shallow soil, the trees attain good size, the fruit large and handsome. At Newcastle, Silva & Son and Dr. Frey have grown a number of different varieties of oranges, as Australian Navel, Mediterranean Sweet, etc., all doing well. Near Penryn several places have trees eight to ten years old. At Auburn, at a considerable elevation, orange trees are growing well. The selection of the proper site, free from killing frosts and abundantly supplied with water, are here necessary to make the tree a success.

YOLO AND SACRAMENTO COUNTIES.

Both of these counties are comparatively level and must be considered as furnishing less favorable sites for orange-growing than the foot-hills, but it remains nevertheless a fact that at Sacramento a large number of orange as well as lemon trees are found in the gardens fruiting freely. At Woodland also a number of trees have fruited for several years past.

STANISLAUS COUNTY.

At Knight's Ferry a fine orange orchard is growing. For a number of years it has produced fruit, samples of which, shown at the San José fair in February last, attracted general attention.

The interior counties of the southern San Joaquin have not been sufficiently developed to prove their adaptation to orange culture, but enough has been learned to conclude that there exist favorable sections along the foot-hills of Fresno, Merced, Tulare, and Kern Counties where with proper irrigation oranges might be a success. From Porterville, Tulare County, oranges were exhibited in San Francisco two years ago which compared favorably with those grown in any part of the State.

SOLANO COUNTY.

The interior of Solano County, in the upper part of Pleasant Valley, and also on Putah Creek near Winters, are small plantings of oranges. Among these that of John R. Wolfskill produces quite early fruit, which has been marketed in December.

SOUTHERN COAST REGION.

Oranges are produced in San Luis Obispo County, but as far as we have learned not in sufficient quantities to appear in market.

The five counties which alone so far have figured as orange producing counties are Santa Barbara, Los Angeles, San Bernardino, San Diego, and Ventura.

Santa Barbara has a number of trees scattered over the town. These, in common with all other citrus fruits near the coast, are very black with the scale. North of the town, on the Hollister estate, an orchard of 20 acres is to be found. At present it is suffering severely from attacks of *Icerya purchasi*. South of Santa Barbara, at Montecito, are a number of orchards, many of them showing great lack of attention. A striking contrast among these is the orchard of Mr. Johnston, who by attention has proved that oranges pay there. The soil is a sandy loam.

At Santa Paula, Ventura County, Mr. N. Blanchard has a thrifty twelve-year old orange orchard, mostly seedlings. The soil is a deep sandy loam. Irrigation is practiced to some extent. About the town of Ventura are scattered orange and lemon trees. In the interior of the county, at the Comulas ranch, are some of the oldest trees in the State. For many years these have produced fruit reputed to be very fine.

Los Angeles County has from the beginning maintained the supremacy in regard to the yield of oranges, and while the prodigious growth of towns and cities is making heavy inroads in the groves, so many trees are being set out every year that the equilibrium is still maintained. In the immediate vicinity of Los Angeles the orchards are rapidly disappearing, the famous old Wolfskill orchard having been cut up recently. As the spread of various scale insects has made sad havoc with many of the orchards, the rapid settling of the land for town purposes may be considered fortunate for the individuals who sell out, but the total abandonment of many orchards to the ravages of insects is necessarily fraught with danger to other orchards in the country.

Pasadena, now considered a suburb of Los Angeles, was originally planted out to orange trees chiefly, but now it is following the fate of Los Angeles, by being converted into town lots.

Farther out, in San Gabriel Valley, a number of large orange orchards exist, although many of them are sadly neglected. One of the best kept and consequently best paying orchards is that belonging to Mr. A. B. Chapman. The soil in which the orchard stands is of a very sandy nature, in many instances the substratum being pure sand only 2 feet below, yet by judicious irrigation and fertilization this orchard compares favorably with any other in the county. The mode of fertilization is by floating manure in the water sent over the place in small ditches, and from there passed into square basins surrounding the individual trees. The walls of these basins are made by throwing up the earth in a ridge a foot high.

It is generally agreed by all persons engaged in orange-growing that slightly-elevated mesa lands are better adapted to the growth of the orange, which here invariably is of a much brighter hue, owing chiefly

to absence of scale. A number of thriving settlements vie with each other, proclaiming superior advantages. Of the older settlements, Pomona shows many fine orchards. The tendency everywhere seems to be to replant the seedling with superior varieties, especially the Washington Navel.

The Santa Ana Valley contains still a large number of fine orchards, but many are suffering very severely from the attacks of the red-scale (*Aspidiotus aurantii*), which is playing sad havoc with lemons; also, growers are somewhat discouraged, but the more determined are preparing to protect themselves in various ways.

The soil is variable, but about Tustin and Orange is a deep, rich, sandy loam. The number of orange trees reported by the assessor was about 800,000.

SAN BERNARDINO COUNTY.

The brighter appearance of the fruit produced on the high mesas of Los Angeles County is still more pronounced in the mesas of San Bernardino, and from the fact that the largest sections growing handsome oranges being at Riverside, has led to the market quotation "Bright Riversides." This brightness of fruit and leaf is chiefly due to the absence of the black-scale, and lends a great charm to the well-kept orchards of this county.*

The first orchards were planted there in 1872. In the year of 1885 there were estimated to be 193,000 trees of various ages, and the yield in 1885 amounted to about 500 car-loads, which sold probably for about \$360,000. These figures are furnished by Mr. L. M. Holt. For the area all in oranges no portion of the State presents as fine a showing. This is undoubtedly due to the fact, aside from the climatic conditions, that orchards are chiefly small holdings, and that the owners have attended in a large measure to details themselves, and have been especially watchful in regard to injurious insects. The soil at Riverside varies from a sandy loam to a reddish clay loam. Irrigation is practiced, and the best cultivators use about one-third inch per acre.

The trees are generally trained high, giving trunks of 4 feet; no weeds are allowed to grow in the orchard; the cultivation following in a day or so after each irrigation.

With the exception of occasional freezes, which in some years have affected the crop in portions of the Riverside district, orange-growing has proved exceptionally profitable. The success attained there led other portions of the country to engage in orange planting, and on the mesa lands, on the opposite side of the valley, large young orchards are now coming into bearing. In the district of Lugonia, Redlands, and Colton Terrace, some very fine orchards are growing, which have produced very superior-looking fruit. According to the *San Ber-*

* I wish to add my emphatic indorsement of this statement. It has never been my pleasure to elsewhere see so fine looking orange orchards or so handsome fruit as at Riverside. (H. E. VAN DEMAN.)

nardino Citrograph there are growing in San Bernardino Valley about 50,000 trees. To this must be added the colonies of Etiwanda and Ontario with perhaps 700 acres of citrus trees, or about 70,000 trees.

SAN DIEGO COUNTY.

In the immediate neighborhood of San Diego and National City exist a number of small orchards which have produced some very superior-flavored fruit; their color has been naturally affected by the presence of the black-scale, but which, owing to a limited supply of water, have not been in the most flourishing condition. With a better water supply this is already changing. But here, as everywhere else, the superiority of the mesa lands is rapidly being recognized. One of the best and largest orange orchards is that of W. W. Whitney, at Highlands, some 5 miles back of the bay. In portions of the interior valleys of El Cajon and Poway the orange does well. In the somewhat elevated valley of San Jacinto the writer saw some few fine orange trees, and understands that the upper portion is being planted to this fruit.

ARIZONA.

The data on orange-growing from the western section is confined wholly to the town of Yuma, on the Colorado River. Young orange trees have been planted in many of the yards during the last year and are doing comparatively well, but few have attained age enough to bear. At the Southern Pacific Hotel there are several trees 15 feet high, which were transplanted three to four years ago from the old barrack grounds; they are fruiting some now. Mr. John Gandolpho, a very intelligent Italian merchant in town, has a tree five years planted which has been fruiting two years, and, as he informed me, ripens in December. Soil a sandy loam.

From central Arizona Mr. Lincoln Fowler, of Phoenix, reports that several trees are growing in the Salt River Valley which are now full of fruit, and that they are turning yellow now (October), indicating that they will ripen in December. As might be expected from the dryness of the climate, no black-scale seems to be able to live; all trees of all kinds, even the oleander, which is nearly always affected, being perfectly free. Some attempts have been made on bottom-lands to grow the orange, but the frost has in one instance killed a young orchard to the ground; this, however, consisted of only one-year-old trees and unprotected. Doubtless the mesas are the only safe places for citrus culture, being much less affected by frosts than the lower land. The lowest record of the thermometer for eleven years at Yuma is 22½° F.

THE LEMON.

The lemon (*Citrus limonum*) is less hardy than the orange, and although it may seem strange, experience has proven that it is better adapted to the cooler climate of that part of the coast region where frost does not

prevail. This is for two reasons : First, its chief value is its acid, and it does not require as much heat to develop this quality as the orange requires ; second, it matures fruit nearly all the year round, and is therefore more valuable than where it ripens all, or nearly all, its fruit at one time. There is only one objection to selecting the moist climate of the coast, the same as that against olive culture in that region, viz, the great liability to black-scale, and, in consequence, the smutty appearance of the fruit ; but as the lemon is a smaller tree, and the scale easily killed by washing, the objection is not very serious.

SOIL.

A well-drained sandy loam is unquestionably the best for the lemon, especially when on its own root is this necessary. On orange stock it is much more hardy. Good results are obtained on extremely sandy soil by manuring and plentiful irrigation.

IRRIGATION.

The rain-fall in that part of the State devoted to lemon culture being rather scant, considerable irrigation is practiced, the amount varying according to the soil and location.

The lemon is generally propagated by budding, the stocks being different. The orange seedling is generally conceded best. The Chinese lemon, which readily grows from cuttings, was formerly considered the best, but it is being discarded, as it is subject to gum disease. The lemon itself may be propagated from cuttings, which form very good trees, but it is generally maintained that such can not attain the age that seedling trees can reach, and experience proves this to be true.

In pruning, the lemon is generally not cut more than is necessary to give it shape, which consists in heading back the tree for several years in succession about one-half of its growth, also thinning out the shoots, so as to prevent too dense a growth. This latter is also necessary after the tree has reached the bearing age.

TIME OF BEARING.

A lemon tree, on two-year-old root, begins to bear in three or four years. Many prefer to allow the orange trees intended for stock to become large and strong (five or six years old) before budding. In such a case only two years are required before the lemons come into good bearing, and a box of lemons can be counted on for the third year. Under favorable circumstances it is reasonable to expect an increase of a box a year until the trees have attained full-bearing size, when they will yield from three boxes upward.

CURING.

To become a perfect lemon the fruit must be picked at a certain stage, which time varies a little according to the variety. Generally it is fit to pick when it shows the faintest signs of turning yellow. Such

varieties, as the Eureka, are picked when quite green, and will still mature. When picked, the lemons should be assorted to ripeness and size, placed in boxes and set in a cool airy place, where they remain for three or four weeks, when they are ready for permanent packing and shipment.

VARIETIES.

The chief varieties cultivated in Los Angeles are the Lisbon, Eureka, and Genoa. The Lisbon is by many growers considered the best, having a very pretty shape. The tree has small thorns. The Eureka is a thornless variety; the type of the fruit is somewhat longer than most varieties; it has very few seeds, and is an excellent bearer. The Genoa is also an excellent thornless variety. Several seedlings have originated in the State. One was first propagated by Dr. E. Kimball, of Haywards, known as the Alameda Seedling, under which name we find it at Pomona. The Bonnie Brae originated with Mr. H. M. Higgins, of San Diego, and is one of the handsomest lemons existing, but does not seem to have met the expectations of the originator; one of the objections seems to be a tendency to crack open.

NORTHERN CALIFORNIA—INTERIOR.

The lemon, being less hardy than the orange, is not found as abundantly in the northern part of the State; still it is found in a good many counties where the orange has been tried. In Placer County, near Newcastle, we have seen several trees. At Oroville, in Butte County, we find them in the gardens mingled with orange trees. In Marysville, Yuba County, the lemon tree is seen in many gardens. In Sacramento a large number of trees may be seen bearing well. In Solano County, in Pleasant Valley, or rather on the rolling hills about the valley proper, also in the adjoining Vaca Valley, lemons are found.

NORTH CENTRAL COAST REGION.

In Napa Valley, as high as Calistoga, we find lemons. Near Saint Helena Mr. George Beach has several young trees, which have grown without protection for two years. In a number of gardens other lemon trees are found. In Sonoma, Santa Clara, and Contra Costa counties lemon trees are found scattered all over, but are planted only in protected nooks, especially in the thermal hills of these valleys. In Alameda County, at the Old Mission, San José, and at Niles, on the Shinn place, are lemon trees. At Haywards Dr. Kimball has quite a number of trees which are proving profitable. In fact, it seems that where sufficient shelter is given from the strong trade winds the lemon will do well around the Bay of San Francisco, especially if planted in a sandy loam.

SOUTH CENTRAL CALIFORNIA.

In the southern part of the San Joaquin Valley, to our knowledge at least, few lemon trees exist.

SOUTHERN CALIFORNIA.

The lemon is well adapted to Santa Barbara County, and flourishes there everywhere, even on the sandiest land, provided they receive water enough. The black-scale of course troubles it, but it bears abundantly in spite of the insect. Several large orchards exist, which before the advent of the cottony-cushion scale were quite profitable.

Ventura County has much land well adapted to the lemon, but not yet extensively cultivated for that purpose. At Santa Paula, 14 miles from the sea, it does exceedingly well, and is found in most gardens. Mr. N. Blanchard has here a fine and profitable orchard of the most valuable varieties of lemons. The soil is a deep sandy loam, and deciduous trees are not generally irrigated, but it is thought necessary to irrigate the lemon at least two or three times a year.

LOS ANGELES COUNTY.

The coast climate of this county is well adapted to the lemon, still there are not many large orchards. Most of the gardens have lemon trees planted. In San Gabriel Valley are several lemon orchards, and from there some really fine lemons were sent. The most extensive orchard is that of A. B. Chapman. The Genoa, Lisbon, and Eureka are the varieties most grown here. The soil is of a very sandy nature, and plentiful irrigation and manuring are resorted to. The trees under this treatment are vigorous and have a deep-green tint, which is the best sign of a healthy lemon tree.

POMONA.

In this colony are a number of fine young orchards coming into bearing. In Santa Ana Valley Mr. H. K. Snow has one of the largest plantations.

The number of lemon trees growing in Los Angeles County, according to the report of the assessor in 1886, is 55,620, the largest number in any county. In the southwest part of the county, about Orange, the lemon is cultivated to some extent and does exceedingly well. Irrigation is here practiced freely.

SAN BERNARDINO COUNTY.

At Riverside the lemon was formerly planted more extensively, but part of the land devoted to it being subject to slight frosts, it is cultivated with success only on the gentle slopes above the valley.* The total absence of the black-scale accounts for the brightness of the color of the lemons produced there; this peculiarity alone commanding a better price for the fruit. Other parts of San Bernardino produce some lemons, but the prevailing citrus culture is of the orange. The number of lemon trees growing in Riverside is estimated by Mr. L. M. Holt at 18,000. The *Citrograph* reports only 700 for east San Bernardino. Ontario claims quite an area.

* By far the best lemon orchards noticed by me in the State were at Riverside, being less injured by frost and better loaded with fruit. San Diego County is equally good for lemon culture. (H. E. VAN DEMAN.)

SAN DIEGO.

Until late years the lack of water available for irrigation in this county has been a drawback in lemon culture, and it is only within the last few years that the lemon orchards have been properly attended. That this county is as well if not better adapted to lemon culture than are adjoining counties there is sufficient proof. Several valuable seedlings have originated here. The black-scale is troublesome immediately on the coast, but in the higher lands, away from the sea, it is very easily managed.

ARIZONA.

The only record of lemons bearing in this Territory is from the town of Yuma, where there are a good many young trees bearing a little, few of them being more than four years planted. Mr. J. Gandolpho has a tree planted five years, now about 15 feet high, which last year produced about two boxes of fruit. It is fruiting sparingly this season. The soil is a sandy loam, and surface irrigated.

Mr. L. Fowler, from Phoenix, reports that there are a few trees growing in the Salt River Valley, but too young to bear yet.

THE LIME.

(*Citrus limetta.*)

The lime being much more tender than either lemon or orange, naturally has a more restricted range in California than either of those fruits.

NORTHERN AND CENTRAL CALIFORNIA.

Although there are instances on hand in several places in this part of the State of limes bearing, their liability to being frost-bitten severely at times must exclude their cultivation for all practical purposes, except in some little sheltered nooks.

SOUTHERN CALIFORNIA.

At Santa Barbara, Monticeto, and Carpenteria the lime is seen in many gardens, and in the more sheltered places does well, bearing profusely, being here, as are other citrus fruits, subject to black-scale, and is rendered unsightly if not treated specially. At Santa Paula, Ventura County, the lime does well, being planted, as in Santa Barbara, chiefly as a hedge. In Los Angeles County the lime has been used in the same manner as in the previously-mentioned counties, but owing both to the ravages of insects and uncertainty of crops from occasional frosts it is rapidly being abandoned. One of the few remaining lime plantations is found on the Sierra Madre villa, San Gabriel Valley. The locality is remarkably frost-free.

About the Bay of San Diego the lime flourishes well, if planted on good soil and is well irrigated.

In San Bernardino County but few lime trees exist. At Riverside they have been abandoned as being too tender.

ARIZONA.

The lime can be seen in several of the gardens in Yuma, where with sufficient care it does well. The largest tree is in the yard of Mr. Gandolpho, having been planted five years. The tree is now 12 to 15 feet high, and has been for two years past producing a few large limes. The tree is pretty well loaded now (October 1), and the fruit is ripening fast.

OTHER CITRUS FRUITS.

Beside the orange, lemon, and lime, the citron is met with, having ripened even at Sacramento, but its culture has never been undertaken upon a commercial scale. The shaddock, likewise, can only be considered a curiosity, sometimes cultivated for its large flowers. The variety called Grape-fruit* has recently been introduced from Florida. The sweet lime† (the Mexican *Lima dulcis*) has fruited in Santa Barbara, but will probably always remain as a curiosity, being quite tender.

TROPICAL FRUITS.

GUAVA.

The guava is an evergreen shrub belonging to the Myrtacæ. The only two species which have come to my notice as being cultivated for profit are the Strawberry guava (*Psidium catleyanum*), and the Yellow (*Psidium pyriferum*), also called the Pear guava. The Strawberry guava, a native of China, is a shrub with roundish, dark-green, leathery leaves, quite ornamental; flowers small and inconspicuous. This tree blooms during the summer, and the fruit begins to ripen in October, and in southern California lasts for several months. The fruit varies in size from that of a cherry to a small plum, is dark red outside, with flesh-colored pulp, juicy and refreshing, reminding one of the strawberry with a little of the myrtle flavor. It is cultivated on a small scale in southern California, and has fruited even in Berkeley and Sacramento. But the largest specimens of trees we have seen are growing in Cholla Valley, near San Diego, these being probably 12 to 15 feet high. In the Los Angeles market are to be seen guavas ripe and for sale at good prices, because they come at times when other fruit is scarce. This fruit may be eaten uncooked with cream, and is good in preserved form.

A sandy loam seems best adapted to the growth of the plant, but it can be grown on other soils also. The guava will endure slight frosts, and bear fruit in most localities, but it is well to protect it the first year.

* This should properly be called *Pomelo*, and may be said to be an edible variety of the shaddock family, and by some botanists is named *Citrus pomelanus*. (H. E. VAN DEMAN.)

† This fruit is practically valueless, being insipid and to most tastes nauseating. (H. E. VAN DEMAN.)

In a moderately moist soil, with a rain-fall of about 20 inches, it will do well without irrigation, but in a sandy soil it requires irrigation the first year. It is propagated readily from seed, also from cuttings under glass.

Psidium pyrifera (Pear shaped guava) is also a bush with large pale-green leaves, fruit large, pear-shaped, yellow. So far here, it has grown only to small size even in sheltered localities, being, as it seems, far more tender than the Strawberry variety. Probably in some of the almost frost-free sections of California it might be grown successfully. So far, we have not learned of its having ripened fruit except at Santa Barbara, and here fine jelly has been prepared from it.

ANONA CHERIMOYA, OR CUSTARD-APPLE.

There exist in South America a number of species of Anona. The only one so far tried with success in California is the Cherimoya. This species is a small tree, with dark handsome leaves. It is quite tender, and its culture, if attended with profit at all, must be confined to the warmer coast sections of Santa Barbara, Los Angeles, and San Diego Counties. The tree has been grown in but few localities as yet. In Berkeley it succumbed at 28° F., and it is probable that it will not endure long even at 30° F. Trees distributed from the Experimental Gardens of the University of California, are grown in the thermal belt of the San Gabriel Valley. At San Diego, Los Angeles, and Santa Barbara it may be seen in gardens. The greenish-white flowers exhale a delightful odor, similar to that of a freshly-cut musk-melon. At Goleta, Santa Barbara County, Mr. J. Sexton succeeded for several years in bringing to perfection fruit, specimens of which weighing 1 pound were sent to Mr. E. J. Wickson, who pronounced them excellent.

BANANA.

The banana has been planted in a number of counties in this State even as far north as San Mateo. The Abyssinian banana grew to the height of 30 feet, and produced seed from which plants may now be seen growing in many parts of the State. As is well-known, this species has a fruit that is of little value, and the plants have always been regarded as the hardiest of the family. The common banana (*Musa rosea*) has been planted in many places in southern California, and in very frost-free localities it matures fruit of very fair quality. Thus, for instance, we ate in September, 1886, bananas grown in Tustin, Los Angeles County. It will do well in localities where the Cherimoya succeeds, but considering that we receive the fruit in abundance from Mexico and the South Sea islands, its profitable cultivation here is exceedingly doubtful.

ARIZONA.

In the gardens of Yuma the banana can be seen, and it is fruiting in various places, but the leaves suffer much from the strong winds,

and need protection. As much as half an acre of plantains were at one time planted, which fruited, but were finally abandoned, chiefly on account of lack of water. In the Salt River Valley, the banana is fruiting for the first time this year.

DATE PALM. (*Phoenix dactylifera*.)

In a report to the U. S. Department of Agriculture in 1883 the writer recorded all the available facts in regard to date culture, and translated extracts from the monograph on the date by Prof. Theobald Fisher, of Prussia. To this, those interested in this remarkable tree are referred.

Since my more thorough acquaintance with the climate of our State, I have not had occasion to change my expressed opinion of five years ago, that in California and Arizona we have a climate well suited to the production of the date.

The peculiar climate here, marked by long rainless summer, and winters scarcely to be called winter, is strikingly similar to that of the Orient, where the date flourishes. The reason of our not having demonstrated practically the culture of the date is, I think, due chiefly to the fact that in no one locality have there been fully combined the three most important conditions for successful date culture, viz: requisite amount of heat, water, and proper care in fertilization of the fruit.

CENTRAL CALIFORNIA.

At the ranch of J. R. Wolfskill, on Putah Creek, the case of a seedling date-palm ripening fruit was recorded in my report in 1882. The tree has continued to increase in size, and when the writer visited it this season it was found to be full of large bunches of well-developed fruit. Last year the fruit ripened in November, but this year it promises to be earlier.

In Fresno County date trees growing on the grounds of the Eisen vineyard, and also on that of J. C. White, bloomed for the first time this year. Those on the Eisen vineyard did not set; the result of those belonging to Mr. White I have not learned. At the Hollister estate, of the palms mentioned in my report of 1884 several have fruited, but the fruit, as might be expected, owing to the cool locality, ripens toward spring. The fruit is orange-colored, and said by parties having tasted it to be of fair quality.

We have learned of no other trees fruiting in southern California, although, as stated in the report referred to, there are many trees growing now chiefly planted as ornament and treated as such.

ARIZONA.

In the gardens of Yuma the date palm can be seen, but the trees are still too young to bear. From Phoenix, Salt River Valley, Mr. L. Fowler reports as follows:

There are in Salt River Valley a number of date palms grown from the seed of the date of commerce. The oldest tree (probably a staminate) is fourteen years old

and has never fruited. At the Calistoga ranch, a few miles from Phoenix, there are two trees seven years old, one of which this year produced three bunches weighing together 20 pounds. The date itself is the size of an ordinary plum, yellow, and egg-shaped.

The samples sent me were unfortunately picked too early (September 20), and has consequently shriveled up badly. They showed, however, presence of plenty of sugar, and the seed was well developed, proving that they had been well fertilized. If left on the tree they would probably have been fully ripe at the end of October. This would indeed be a very favorable showing, and justify extensive experimenting.*

ALLIGATOR-PEAR.

(*Persea gratissima.*)

This tree produces the "Agua cate" of the Mexicans. It is a stately evergreen tree, and highly ornamental. Although a native of truly tropical climes—the shores of the Gulf of Mexico and the Antilles—this beautiful tree can withstand considerable cold, and with a slight protection in its first growth, has already proved hardy in many places. We have found the tree even in as high a latitude as Marysville, Yuba County. Two specimens are growing on the experimental grounds in Berkeley, and with very slight protection have survived 22° F. In Los Angeles and San Diego gardens the tree is frequently found. The only successful case of fruiting known to us is at Monticello, near Santa Barbara. The tree is growing on the grounds of Mrs. Flora Sawyer, in a well-protected place, where a number of exotic palms also flourish. It is now just fourteen years old from the seed, which was brought from Mexico and planted by the owner, Mr. Silas Bond. It has always been well cared for, and has attained a height of about 25 feet. The shape of the crown is oval. This tree has produced fruit for three years in succession, and at the time of our visit, in September, it was just beginning to ripen. Samples received at the time were quite hard, but in two or three weeks turned soft and proved very palatable, the taste resembling custard, with a flavor of beef marrow. In appearance the fruit resembles a huge California laurel berry, of an elongated egg-shape, about 3 inches long. Unfortunately the bulk of the fruit consists of a large seed.

WHITE SAPOTA.

(*Casimiroa edulis.*)

The white sapota, or, as it is called by the Spanish, "Zapote blanco," is one of the many trees that has been brought from Mexico, of which

*On October 3, 1887, I received a cluster of ripe dates from O. F. Thornton, of Phoenix, Ariz., which were grown on the ranch of Colonel Hatch, near that place. There were 211 well-developed fruits on it, and together weighed 5 pounds. The flavor was very sweet and rich, and the color a chrome-yellow with a tinge of brown. A staminate tree stood near the one which bore this fruit, and the seeds were perfect. As my informant said there were three bunches of fruit on the tree, I am quite sure the above-mentioned trees, and these, are identical. (H. E. VAN DEMAN.)

country it is a native. Mr. H. C. Ford, president of the Santa Barbara Horticultural Society, was the first to call public attention to this tree in an article written ten years ago for the California Horticulturist. In his company the writer visited two trees of this species growing in some abandoned lots formerly the property of the Old Mission of Santa Barbara. As near as can be learned, one of the trees is eighty years old. Another, probably thirty years old, is at least 25 feet high, and has a trunk 25 inches in diameter. The trees are spreading in growth, the leaves are dark and glossy, the trunk is of an ashen-gray color, and with numerous warty excrescences. Though they are entirely neglected, they ripen fruit every year in March and April. Mr. Ford describes this fruit as of roundish form, about an inch in diameter, with a juicy pulp of a pleasant subacid flavor. At the time of my visit, in September, the trees were loaded with greenish-yellow flowers, exhaling a pleasant odor. The white sapota is apparently quite hardy in this locality.

MELON SHRUB.

(*Solanum Guatemalense*. ?)

This is a small half-herbaceous shrub, which was brought to California from the table-land of Guatemala by the late Mr. Greleck, of Los Angeles. The fruit is yellow, splashed with violet, somewhat of the shape of the egg plant, but is seedier, and is readily propagated from cuttings. Plants grown at Berkeley have not succeeded well. At Los Angeles we saw thriving plants at Mr. Greleck's place several years ago, but from all indications they ripen rather late, and require a more tropical summer to reach perfection. Few persons seem to like their flavor, which is something like a tomato and melon mixed. Fruits were sold in Santa Barbara market this fall.

GRANADILLA OR EDIBLE PASSION-FLOWER.

(*Passiflora edulis*.)

There exist in Mexico several species of *Passiflora*, bearing edible fruit, deserving trial in California. Among those tried already the *Passiflora edulis* is best known, having been planted in various parts of the State. The flower of this species is of medium size, whitish, with a bluish tint. It blooms and bears almost the year round, and is a climber of strong growth. The fruit is the size of a small hen's egg, of a light purple, and when ripe has an acid cooling flavor. From it a good jelly may be prepared. In Santa Barbara we have seen this climber more frequently than elsewhere.

COFFEE.

(*Coffea Arabica*.)

It deserves mentioning that there has been several attempts made in California to cultivate coffee. So far the only promising experiment

was made by a Mr. Morrison, within the city of San Diego. The writer saw trees there three years ago, and obtained specimens for the New Orleans Exposition. Previous to the growing of these trees Mr. Morrison had a tree which matured fruit, but which he claims was removed from his place during his absence. The rapid building up of the city of San Diego made an end of this interesting experiment.

MELON TREE.

(*Carica papaya*.)

The following is an extract from the writer's report on economic plants and trees cultivated at Berkeley :

Mention of this tree has been made several times in previous reports, but we have never been able to report that a favorable location had been found for it. Last year we received a communication in regard to it from Mrs. W. W. Whitney, of San Diego, to whom a single specimen had been sent the year before, and this season, while traveling in the interest of the State Horticultural Commission, I had an opportunity to examine it. The Whitney residence stands on an elevation on the sloping hills above the Sweetwater River, some 4 miles from National City, San Diego County, overlooking the bay. Close to the house, and partly sheltered from the west winds, stands the specimen of the *Carica*, which when sent from here (Berkeley) in the spring of 1884 was only about 3 feet high. It is now a fine tree, over 12 feet high and 24 inches in circumference at the base. It is almost constantly full of flowers, and sets fruits all along the stem, some of these having reached 5 or 6 inches in size. I was rather surprised to see the fruit of such a size, as I thought the *Carica* to be dioecious, but it seems after all, that at least some trees contain both kinds of flowers. The *Carica* seems perfectly at home in this location, its luxuriance showing itself in every respect, the leaves reaching the size of more than 24 inches in diameter. The experiment is very promising, and I hope to see it repeated. The tree, aside from its curious economical properties (see the report of the California Hort. Com. of 1887), is highly ornamental. In appearance it is a combination of the aspects of a palm and fig tree, having the single straight trunk of the first, with the peculiar swelling at the base and the leaf of the latter. This is so striking, that it has received the generic name *Carica*, this being the specific name of the fig.

SEMI-TROPICAL FRUITS.

THE OLIVE.

(*Olea Europea*.)

The olive, with the date and other semi-tropical fruits, was early introduced into California by the mission fathers. It is found to-day as a remnant from the Old Mission garden, but owing to neglect the trees are generally not doing well in these places, particularly on account of the presence of a species of black-scale (*Secanium olea*), which appears to be a native of the State. The first attempt at making olive culture a matter of real interest does not date back much further than 1872. The person with whose name olive culture is justly associated is Mr. Elwood Cooper, of Santa Barbara. In February, 1872, he set out his first trees.

In 1876 he produced his first oil. His plantation now consists of about 80 acres. The plantation is located about a mile from the sea, 12 miles north of Santa Barbara, the climate being very mild, and during the summer subject to heavy fogs from the ocean.

When reaching a certain age the trees have alternate years of heavy and light crops. Mr. Cooper has tried the experiment of planting out trees on successive years, hoping thereby to have a part of his plantation heavily laden each harvest. The experiment was not a success. For a year or two some difference in the bearing will exist, but after a while the one condition, light or heavy yield, would be general.*

A partial remedy for this habit might be had in a suitable system of pruning, but Mr. Cooper has not found profitable any system he has tried.

Several other large plantations have been set out in Santa Barbara County, one in Santa Inaz Valley being especially promising.

In San Diego County the Kimball Brothers, of National City, were among the first to plant the olive on the mesa lands near the bay of San Diego. The rain-fall there being very scant, some irrigation has been necessary. The olive ripens there in October and November, and the yield is early and good; young trees bearing a few gallons of berries at the age of four years, and some trees at six years yielding as high as 30 gallons.

Mr. F. A. Kimball built last season a press, and a fair quality of oil was made, which has been marketed this year.

In the El Cajon Valley Mr. Levi Chase has a very fine orchard, bearing well.

About the thriving settlement of Pomona, in Los Angeles County, a number of olive trees have been planted. The Rev. Mr. Loop has a number of large trees, which at the age of ten years averaged 35 gallons apiece. Mr. White, of the same place, planted several acres of olives. They commenced bearing at about five years old, and increased rapidly. In Pomona are also some of the largest trees in the State, some of them being nearly 2 feet in diameter near the ground. Mr. White has a number of varieties on trial, but so far the Mission and Picholine are the only ones tried. Of the Mission variety there are here evidently two kinds, according to Mr. Loop, one ripening very much earlier than the other, the first ripening being small and the late ripening large. At San Fernandino Mission, in San Fernandino Valley, the old trees, nearly seventy-five years old, were cut back, and are now fully rejuvenated and bearing heavy crops. In other portions of Los Angeles County there are trees planted in many places. The largest orchard is that of Mr. C. J. Hopkins at Pasadena. They consist of Picholine and Mission, and the trees are five to six years old. At San

*In my opinion the cause is from climatic and other conditions, favorable to a good crop one year and a consequent depletion of vitality and light crop the next. This often occurs in other fruits. (H. E. VAN DEMAN).

Bernardino we find olive trees bearing in the gardens of the town. At Riverside, at the opposite side of the valley, the olive has grown to large size, but the complaint is made that the trees are not so prolific. The cause is undoubtedly too much or too little irrigation. We have seen on the grounds of Mr. H. Bliss young trees seven years old loaded with fruit, producing probably 150 pounds of olives.

INTERIOR CENTRAL REGION.*

Some trees have been planted in Fresno county, but they are yet too young to give a record. The only trees which have come under our observation are grown on the Fresno Vineyard Company's property, east of town. The trees looked bright and healthy, were in their fifth year, and have set some fruit. The soil here is a red-colored loam; the trees are irrigated.

About Tulare City olive trees are on record as having borne, the exact yield of which I have been unable to learn. There is no reason why they should not succeed there, unless from the water rising too near the surface, caused by too copious irrigation.

In Stockton, San Joaquin County, the olive bears well, although the heavy adobe land in the immediate vicinity can not be considered adapted to its best development.

CENTRAL COAST COUNTIES.

San Luis Obispo, Monterey, and Santa Cruz counties have all proved more or less adapted to the growth of the olive with the exception of the effects of the black-scale in the moist parts of these counties. In the interior part of the first-named county large orchards are being planted this season.

CENTRAL BAY COUNTIES.

In Berkeley, Alameda County, at the University, there are growing two trees planted in 1872. At first they were totally neglected, remaining in consequence but barely alive for the first two years; but when cultivated grew rapidly and produced at eight years 50 pounds of olives; at ten years their yield was 100 pounds each; at twelve years the yield was 225 pounds each, the crop of alternate years being quite small. Still the location must not be regarded as an altogether favorable one.

Mission San José.—At the old mission grounds, in Santa Clara County, now the property of Mr. Juan Gallegos, a number of old large trees are growing, planted about one hundred years ago by the mission fathers. According to Mr. Gallegos these trees were perfectly free from black-scale until about nine years ago, when he thinks it was in-

* From my own observations and numerous reports I have concluded that the foothill regions of the interior mountain ranges of California are better adapted to the growth of the olive than any other. The scale insects do not flourish there, and the soil and climate are peculiarly suitable to the slow growth of the tree and the production of the fruit. (H. E. VAN DEMAN.)

troduced with some orange trees. Before the advent of the scale the trees did exceedingly well. By severe measures, cutting back, etc., Mr. Gallegos has managed to bring them back to productiveness. The soil is mostly of a decidedly heavy character, a black adobe in many instances.

In many portions of the county young olives are being planted. Irrigation is not practiced.

In Santa Clara County exists the largest olive orchard in the central portion of the State, on the Quito ranch, 5 miles from Los Gatos.* The oldest trees on the place are twenty years old, but the majority of the trees, some 3,000, are only eleven years old, half of which were transplanted, being too close together. The trees were topped back severely and have all done well, and in two years commenced bearing some. In 1884 the yield of 1,000 trees which had not been removed or pruned severely amounted to 21 tons of olives, part of which was made into pickles and part into oil. In 1885 the yield was very light, and also in 1886. This season it promises to be good, but not as good as was expected last spring. The soil where the orchard stands is a gravelly loam and the land level; no irrigation for young trees has been practiced. Olives are found in various portions of the valley doing well without irrigation.

NAPA COUNTY.

At Saint Helena we have seen several trees of the Mission variety growing on the farm of Mr. Llewelling. The oldest trees were planted ten years ago, and began bearing, five years after, alternately light and heavy crops; received no irrigation, and are about 15 feet high and 8 inches diameter.

At Oak Knoll, the property of D. Melone, 5 miles from Napa City, we have seen specimens of olives bearing for some years.

A most interesting experiment from this section deserves especial mention. In November, 1884, Mr. A. Flamant, of Napa, set out in the hills west of the town several thousand rooted cuttings of the Picholine variety. Holes about a foot deep were dug, and in many instances the little trees were planted on the rocky soil, and earth enough to cover the roots had to be taken from elsewhere. During the summer hoeing was done sufficient to prevent baking of the ground, but no irrigation was practiced. In the most exposed places probably 10 per cent. died, but were replaced the next year. In the summer of 1887 most of the trees were in good condition, and having reached a height of 6 feet during three seasons' growth. Certainly a very encouraging showing, considering the quality of the soil.

The olive has succeeded well in the county of Sonoma in a number of different locations, the oldest and best kept orchard being that of Mr. George Hooper, near Glen Ellen, who this year obtained the prize for the best oil exhibited at the Mechanics' Fair in San Francisco.

* Very recently I visited this orchard, and found the older trees bearing a medium crop. The owner, Mr. E. E. Goodrich, had built a press and was making oil of very good quality. (H. E. VAN DEMAN.)

NORTHERN INTERIOR.

From Lake County our material for drawing conclusions as to the adaptability of the olive is rather scant, but the instance on record seems conclusive in its favor. In Solano County, near Winters, on Putah Creek, exist probably the largest trees for their age in the State. They were planted twenty-five years ago by Mr. John R. Wolfskill, and many of them measure over 6 feet in circumference. The trees have borne heavily every other year for several years past, though for some reason the crop the last two years has been light. In Pleasant and Vaca valleys there are young olive trees in different places, all doing well. In Yola County, at Woodland, the olive is met with, but yet too young to judge its yield. In the city of Sacramento the olive bears well, but is more healthy on the plains near Florin, where Mr. S. Lea has a paying grove.

About Marysville, in Yuba County, the olive does well and bears abundantly on the sediment lands, as well as in the adjoining county of Sutter. Butte County has many large trees. Mr. George Wöllet has some trees twenty-three years old which are 30 feet high and fully 15 inches through at the base. From eight of these trees, two years ago, were made 64 pint bottles of oil, besides giving 2,000 pounds of berries for pickles. At Chico, Gen. Bidwell has several large trees equally as fine, planted eighteen years. They have been bearing heavily at least every other year since the sixth year from setting. Colusa County, as well as Tehama, has young olive trees bearing.

FOOT-HILL REGION.

The following is an extract from the writer's report to the State Board of Horticulture:

Placer County, Penryn.—The oldest tree about Penryn is a tree growing on Orange Hill, the property of W. R. Strong & Co. The tree was planted six years ago, then probably five years old, but very small, and although grown without care, having received no water (except from seepage from neighboring trees which have been irrigated), is a robust healthy-looking tree about 15 feet high, with a crown diameter of about 10 feet, and 8 inches through at the trunk. The tree has borne for a number of years, and last season produced somewhere near 150 pounds. This season it is bearing considerably. Scattered through the orchard are a number of olive trees of various sizes. The soil is a red-colored so-called rotten granite (Syenite). These latter trees are irrigated, with the rest of the orchard, and some few are in bearing, having been planted about five years.

P. W. Butler has a large number of olives, both of Picholine and broad-leaved Mission, planted along avenues running through the place, which, like all the country, consists of rolling hills, with a similar soil to that mentioned above. The trees were planted five years ago, then small trees, and have received liberal irrigation. They are about 12 to 15 feet high, and commenced bearing last year. The Picholines are full of fruit this year, which was ripe some time ago, much having dropped off; the Missions are not fully ripe now (middle of December). The fruit had not been utilized before this season.

Newcastle.—Mr. Charles Gould, below town, has three fine olive trees about ten years old, which have been bearing for a number of years. The trees are 8 inches

through at the base, with large crowns. The trees (Mission variety) were loaded last season, but the crop is very light this year, though the fruit is of large size. In the town of Newcastle is found an olive tree here and there. Dr. Frey has a tree in his yard doing well, with the exception of the fruit being infested with the *Diaspinous* scale referred to before. The soil is similar to that about Penryn.

Auburn.—In this neighborhood are several good-sized olive orchards, the oldest of these being that of Mr. L. A. Gould, some 3 miles from town. The majority of the trees are the so-called Picholine, which evidently here are five weeks earlier than the Mission. The oldest trees are about seven years, and are bearing quite full, one tree producing 70 pounds; their average height is about 12 feet; the habit very dense. Some oil was made from the Picholine this year, but is not clarified yet.

Beside the Mission varieties and these Mr. Gould has, are two other varieties of olives, one considerably smaller than the ordinary broad-leaved Mission, but of the same shape. Also a variety obtained from Mr. Rock, of San José, called Oblonga, of a peculiar almond-like shape. Although a very small tree, it is loaded with fruit, ripening a couple of weeks before the Mission olive here.

Irrigation has been practiced to some extent by Mr. Gould. The soil is of slaty formation, and the trees seem to thrive equally well on shallowest as on deepest soil. No signs at present of the black scale.

Mr. F. Gloss, a mile or two from Auburn, has quite an orchard chiefly of Picholine; the soil is similar to that of Mr. Gould's and the trees are doing well.

Dr. Agard: About 25 acres in all have been set out in olives by this gentleman of both Mission and Picholine. The oldest trees were planted two years ago (rooted trees), and are about 5 feet high, are branched low, with only about 1 foot of trunk. In spite of the little irrigation these trees have received (10 gallons apiece during the first summer, 15 gallons this summer) the growth has been uniformly good. Dr. Agard reports, however, a much greater loss of Mission trees than of Picholines.

El Dorado.—The climate and soil of this county being very similar to Placer, we have no doubt that a great deal of land of the county is well adapted to the olive. We have learned of one gentleman undertaking the culture with success without irrigation, but have not been able to ascertain anything definite about it. About Coloma there are several trees scattered which have commenced to bear.

There is now growing in this State a large number of varieties of olives, imported by enterprising citizens, nurserymen, and others. France, Spain, and Italy are represented in these varieties, of which so few have yet fruited that correct opinions can not at present be formed on any but two.

The Mission olive—There seems to be really several kinds. Some claim to distinguish six varieties as belonging to the family of oval-shaped olives, of which the Cornicabra in Spain is the type, though M. Tablada, the well-known authority on olives, contends that the exact counterpart of the Mission olive is not to be found in Spain, and it is therefore likely that it was originally raised from seed brought by the fathers from Mexico. The same authority pronounced our Mission olive a superior one for oil. The Cornicabra class is considered a hardy but late ripening family of olives. Its latter character here is somewhat of an objection in the cooler coast climate. For this reason experiments with early-ripening varieties, as the Nevadillo Blanco, are of great interest. A well-grown Mission olive weighs one-sixth of an ounce, is of an oval shape, and when fully ripe is of a purplish-black color.* The pit is of a

* See colored plate in my annual report for 1887. (H. E. VAN DEMAN.)

comparatively small size. Well-made oil from this variety is of superior quality; indeed, one proof of this is the fact that at the World's Exposition in New Orleans Mr. Elwood Cooper's Mission olive-oil was awarded the first premium.

The Picholine.—The late B. B. Reading, esq., a far-sighted gentleman of means, and one who had the greatest faith in olive culture, imported directly from France a number of varieties of olives, which were planted on his ranch near Sacramento. Of these, it appears that all but the Picholine died. Unlike the Mission, this variety readily propagates from cuttings, and thus soon became generally distributed. Whether or not Mr. Reading was aware of the character of this olive we do not know, but after his death it was propagated supposing it to be a large pickling variety similar to the Spanish Queen, but when the tree first fruited it proved to be a small oval olive weighing about one-sixteenth of an ounce. Whether this is the true Picholine we are not qualified to decide, since no adequate description is at hand. Its chief merits with us are, compact, vigorous, and hardy growth, ripening six weeks earlier in a cool climate than the Mission. Its small size is somewhat compensated for by the ease with which it may be stripped from the branches.

PROPAGATION.

In this State it has generally been done by cuttings and layers. As regards the Mission olive, the surest results are obtained from layers, though in southern California the preferred way has been by large cuttings, as described below:

The common and preferred method is to plant the cuttings taken from the trees of sound wood from three-quarters of an inch to an inch and a half in diameter, and from 14 to 16 inches long. These cuttings should be taken from the tree during the months of December and January, neatly trimmed without bruising, and carefully trenched in loose sandy soil; a shady place is preferred. They should be planted in permanent sites from February 20 to March 20, depending upon the season. The ground should be well prepared, and sufficiently dry so that there is no mud, and the weather should be warm. In Santa Barbara, near the coast, no irrigation is necessary; but very frequent stirring of the top soil with a hoe or iron rake for a considerable distance around the cuttings is necessary during the spring and summer. About three-fourths of all that are well planted will grow. My plan is to set them 20 feet apart each way, and place them in the ground butt end down at an angle of about forty-five degrees, the top to the north, and barely cover. Mark the place with a stake. By planting them obliquely the bottom end will be from 10 inches to a foot below the surface.

This mode of propagation, especially in a changeable climate, is liable to several objections. One is that the large cuttings often remain dormant for several years, thus causing an uneven stand. By first rooting the cuttings in nursery rows this of course is avoided, but never will so fine a root system and one almost equal to that from seedling plants be developed, as by starting the trees from small *herbaceous* cuttings.

For at least the cooler parts of the State we do not hesitate in recommending this method: Take from young growing trees the top when neither very soft nor perfectly hard, having three to four sets of leaves, and cut with a sharp knife to lower joint. Put in a little frame with sand. In the course of three or four months the little cut-

tings will have rooted, and should then be potted in small pots, where they should remain until well rooted. In a few months more they will be found ready to set out. When very warm weather prevails a thin mulching around the little tree may be advisable, but when a moderate temperature prevails a few waterings in a month will be all that is necessary, and even this only in unfavorable springs. It should be added that nothing is gained by setting out the trees before the soil is warm, as they will not grow. The trees referred to previously as planted in Santa Cruz Mountain were propagated in this manner, and have received no irrigation since setting out. Trees raised from such small cuttings resemble closely young seedlings, and form a beautiful root system.

To get cuttings from large truncheons, such as are imported from Spain and other countries, proceed in the following manner: Cut the truncheons in pieces about 18 inches long, split those pieces in two, put the halves so made into the ground horizontally with the bark side up, covering with soil 4 to 5 inches deep. Let such bed be in a warm well-drained place, kept moderately moist. In a few months a large number of young shoots will break through the ground. When of suitable size and hardness, as before described, take the cuttings and treat in the manner previously mentioned.

The raising of olives from seeds has not been practiced to any extent in this State, principally because the Mission, the chief one, has a very small proportion of good kernels. The Picholine, so easily propagated from small cuttings, affords a convenient grafting stock. New varieties have been budded in the ordinary way on the Picholine by our enterprising nurserymen, but it is evident from the number of failures, that some important points in the work have been omitted. I have lately learned from Mr. White, of Pomona, that he has successfully grafted the Picholine on Mission stock by means of common cleft grafting, using quite small grafts. The work was performed in April, out of doors, without any special care other than that used by grafting other trees. We refer to this because we know of no other instance where outdoor grafts have succeeded. Grafting on young roots under glass has been practiced by nurserymen to some extent.

GENERAL CONCLUSIONS.

We have seen that the olive flourishes over a large area of the State, and perhaps it may be safe to say that no other fruit-tree is destined to be cultivated throughout such a great extent of this country. Innumerable hills and mountain-slopes skirting our coast valleys, too dry to support any other tree without irrigation, have in the olive a tree especially suited to them. The climate of these hills is nearly always warm, the frosts come late and disappear early in the spring, their nature being such as to provide the drainage that is one of the essential conditions for the healthy growth of the olive.

In other regions, in the richer valleys either of the warmer or cooler sections of the State, there is no doubt that, suitable kinds being selected for each, all varieties may here find a home. Here as elsewhere the usual questions of soil, climate, diseases, and insect enemies must be considered, the last named not being least, particularly the *Lecanium olea*, before mentioned, seemingly a native of the State. This scale will

live, and proves considerable of a drawback in all places near the sea coast, and will thrive even as far as 50 miles from it. As a general thing it becomes scarcer as we leave the coast, but not until we enter the dry climate of the interior valleys can it be defied altogether. Thus we find hardly a trace of it in parts of San Bernardino County and on the foot-hills of Placer County, where the Olive flourishes and bears remarkably well.

If this immunity from the black-scale, which in California has proved to be one of the greatest drawbacks to olive culture, is not counterbalanced by other evils, such as drying winds blowing at the time of blooming, it would seem plain that the olive grower might better leave entirely the coast regions and its influences. I expressed a similar doubt on the question a few years ago in an article recently republished and I believe now, that there are regions less subject to the north winds, and which probably will prove better suited to the growth of the olive than any other portion; we refer to the foot-hills of the Sierra Nevada Mountains at an elevation from a few hundred to two thousand feet. It seems, however, that even there we can not escape the attacks of all kinds of insects; for to my surprise I found a species of diaspinous scale infesting leaves and fruit of the olive at Newcastle, Placer County. This scale proved to be *Aspidiotus nerii*, the oleander scale, which infests the latter tree in the driest part of the State. This pest, however, could be easily guarded against.

ARIZONA.

As in all other fruits, Arizona has still but comparatively short experience to record in olive culture.

At Yuma depot, there are several olive trees growing which show signs of fruit this year. These trees are quite old, perhaps twelve years, having been transplanted from the barrack grounds three or four years ago.

Near Phoenix, Salt River Valley, the olive has only been planted two years; but the tree there, as everywhere else in Arizona, is bright and clean.

At Florence, 60 miles from Phoenix, at the gardens of Colonel Rugles, the olive is reported as having fruited well for two seasons.

THE FIG.

(*Ficus Carica.*)

The planting of the fig began with the missions, and, like the olive, we find it still around every mission. There are few fruits ever brought to this State that are adapted to larger territory here than is the fig. From San Diego to Shasta, in the interior valleys as well as on the coast and on the foot-hills of the Sierras, it is found; and if some very exposed locations very near the sea be excepted plenty of fruit can be matured

everywhere. In the more favored and hotter valleys, certain varieties produce fruit from June to November.

The soil that the fig requires must be moderately well drained, but otherwise it does not seem to be particular, good crops maturing on alluvial loamy soil as well as on sandy soil, while the granite soils of the foot-hills in Placer County seem also well adapted to its growth; but all soils must contain moisture enough to enable the tree to hold its foliage until late in the season, otherwise the fruit would fall prematurely. We lay stress on this, because writers in this State have more than once maintained that the fig will grow on drier land than will any other fruit. On dry land it may live and grow, but the fruit will fail to mature.

CLIMATE AND MOISTURE.

It has been stated that the fig will flourish over a great part of the State; still the interior valleys, far removed from the sea-fogs, are better adapted to fig-growing than are the coast regions, and the future will doubtless see large areas of our rich interior valley lands devoted to fig culture. Compared with the olive, it might be properly said that the fig demands the deep moist soil of the valleys, while the olive will grow on our hills.*

Probably there is no tree (the date excepted), that will stand the hot winds of the interior valleys better than the fig, provided always that the moisture in the ground will hold out. Such winds as will burn the fruit on other trees, will merely hasten the maturity of the fig.

DANGER FROM FROST.

It is true that on very rich damp lands, where an unnatural sappy growth is kept up until late in the season, the fig, when young, is subject to being bitten back by frost; likewise in exposed places sometimes it may be caught by spring frosts and injured severely. Proper irrigation will regulate this, and in moist lands early cultivation should be withheld, thus preventing the rise of the moisture in the soil. As the trees gain age they are in little danger from this cause, such frosts being severe only at the ground. Under ordinary circumstances the fig will stand 18° F., and when perfectly dormant even as low as 12° F.

ADAPTATION.

Although the complete adaptation to all parts of the State is proven by the trees scattered everywhere, yet not many large plantations in regular orchard form have been attempted until late years. The magnificent cool shade produced by the large leaves of the fig has made it famous from the most ancient times, and in this State is planted largely as a shade tree around houses and in the streets of all the interior towns. It may not be out of place, for the sake of greater accuracy, to call attention to some of the large trees in various parts of the

* In the rich valley about Fresno and Tulare I saw the fig growing to perfection. The best possible conditions there exist for the growth of the tree, and the production and curing of the fruit. (H. E. VAN DEMAN.)

State. In the foot-hills of Shasta County, between Ball's Ferry and Shingletown, there is a tree about twenty-five years old over 8 feet in circumference, with a crown diameter of 65 feet. Its yield of green fruit is variously estimated from 1,800 to 2,000 pounds. At Clear Valley Springs, Calaveras County, there are a number of fig trees, owned by Mr. Wildermath, equally large and productive. On the ranch of Chico, property of General J. Bidwell, very large fig trees are found, one of them being a great curiosity. This was planted in 1856, a small poor specimen, and not receiving any special attention; but after some years it grew rapidly, dividing at the base. Several of these stems have now a diameter of over 2 feet. The tree being very low, the branches bent to the ground and the tips took root. This tree, with its numerous branches, covers a circle of 75 feet in diameter. The soil is a rich sandy loam. On the old Hock farm, 9 miles from Yuba City, on the Yuba River, the home of General Sutter, are perhaps found the largest number of old fig trees in California. The largest are more than 7 feet in circumference, but their growth is restricted by their having been planted too close together—only 20 feet apart. These trees were planted in 1855, and bear perfectly full every year.

In Pleasant Valley, Solano County, Mr. Thurber has a magnificent avenue of fig trees which are fully the size of those above mentioned. These were grown entirely without irrigation however, on moist, rich, bottom land. About Stockton, Sacramento, and San José, large trees are met with everywhere.

In the southern portion of the State we meet likewise with large old trees near all old settlements. A very large tree is found near the Old Mission in San Diego.

VARIETIES.

It has been stated before, that few large orchards of more than four years' growth exist in this State. Formerly the fruit was thought by many to be unprofitable, and only the sections growing early figs received a paying figure for their fruit; the principal trouble really being that no fine drying variety had been available. For years past a number of gentlemen have been attempting to introduce for drying, the fig of commerce, commonly known as the Smyrna; more than one attempt having been made to bring the best fig from Smyrna. The trees from some of these importations must be at least five or six years old, but with the exception of trees belonging to Mr. E. H. Parker, of Penryn, Placer County, fruit on these imported Smyrnas has not yet appeared; no doubt this is due solely to the age of the trees. Mr. Parker pronounces his fruit of a superior quality. The foot-hills of Placer County are known for their precocity in fruit bearing.

Besides the importations made several years ago a new shipment will arrive this year, being imported by an enterprising firm in Fresno County. Now that caprification, or artificial fertilization, of the fig through the agency of insects has been fully investigated by the Italian Government and proved to be a myth, it is plain that we have

only to seek the right varieties for drying to make the business a success, and no doubt we have already some of these. The so-called

WHITE ADRIATIC

fig (true name supposed to be Sutasega) was first brought a number of years ago from Dalmatia to Stockton, where, according to Mr. W. W. G. West, the original trees exist, but much attention was not drawn to them before three or four years ago, when this variety of fig was extensively advertised. The fruit, when matured, is of a greenish-yellow color, almost oval in outline, pulp red and rich, seeds small. When dried it is very fine, the size only being inferior to the best imported figs. In regard to its general bearing qualities sufficient is not yet known, but it has been stated on good authority that as regards fruit it is harder than the Mission fig.

MISSION.

The common fig in California is the so-called Mission, raised either from seed by the missionary fathers or brought from Mexico. It is a large vigorous-growing tree, instances of which have been given above. The fruit is small and dark colored. It is an abundant bearer, and its fruit, when properly dried, is very good, and we understand sells quite well in the eastern markets. This fig bears considerably the third and fourth year from cuttings.

There exist in California quite a number of varieties of figs the nomenclature of which is in great confusion. The San Pedro is what has been generally called the White Smyrna, a fine eating variety, but not adapted to drying; greenish-white, white flesh, small seeds.

We will not attempt to go into a description of the different kinds introduced into this State, but will refer those interested in the subject to Dr. G. Eisen's treatise on fig culture, published by the Pacific Rural Press.

DRYING THE FIG.

At the convention held in Los Angeles in 1886 Dr. Eisen exhibited fine dried specimens of the White Adriatic fig, and in Sacramento, November, 1886, W. M. Williams, of Fresno, showed the same fig.

Dr. Eisen describes his method thus:

In drying the figs which I have exhibited here to-day I endeavored to follow the Smyrna way as much as possible. While we evidently have yet much to learn in regard to the drying, and manipulating the figs after they are dried, I still believe that we are a good way on the right track, and it will be for you to decide if my suppositions are correct. The variety exhibited at this horticultural meeting is the Adriatic, not only the best, but the only one which I have so far found suitable for drying for commercial purposes.

When the figs began to wilt and show small white seams they were cut from the trees by means of scissors or a knife, then carefully placed on trays similar to raisin trays. I believe a further great improvement would be to nail laths across the bottom of the tray in such a way that they would form longitudinal ribs on the bottom just the thickness of the lath, or about one-eighth of an inch. By placing the figs with the eye elevated on the rib the sugary contents are prevented from leaking out,

which else may happen quite frequently. The figs are now placed in the sun to dry. They were turned every day, at first separately by hand, but when partially dried were turned in the same way as we turn raisin trays. Every night they were covered over, and for this purpose it is best to have all the trays on one place and not scattered around, as is the custom with raisin trays. The figs are sufficiently dry when they show the same dryness in the morning as in the evening. This is a point of great importance. If not sufficiently dried, they will puff up and spoil, as if they were in a state of fermentation. In the evening the figs may seem to be sufficiently dried, but in the morning they will be found slightly swollen and puffed. They must then be dried more. It is, however, a great danger to overdry the figs. Such figs will get a cooked and earthy taste, which afterwards will never leave them, and which will injure them or spoil their value entirely. It took from five to twelve days to dry the figs, according to the weather. When dry they may be dumped into sweat boxes for a few days, but the better way is to dip and pack right away. Now prepare a kettle or tub with boiling water, in which put enough common unrefined rock salt, such as is used for cattle; table salt will not do. I believe the more unrefined the salt is the better. Sea-water may be preferable. The latter and the rock salt contain substances which preserve the moisture of the figs and keep them pliable. About three big handfuls of rock salt to one gallon of water is enough. When the salt is dissolved and the water is again boiling immerse the figs for two seconds; immediately afterwards thumb the figs, and work the eye of the fig downward and the stalk end upward; in fact, imitate the appearance of the imported Smyrna fig. This process is necessary. First, it distributes the thicker skin around the eye of the fig evenly, and in eating we thus get equal parts of the thicker skin and equal parts of the thinner skin. Secondly, it places the fine skin of the stalk end all on top, and when the figs are packed and pressed they present a beautiful smooth surface. I believe the dipping of the figs in *boiling* salt water may be dispensed with if the figs are sufficiently pliable without it. But it is absolutely indispensable to dip the figs in salt water, and during the thumbing of the figs the hands of the packer must be constantly moistened by salt water or the sugar will stick to the fingers and make the operation almost impossible. After having been dipped in the brine the figs taste at first exceedingly salt, all the salt being on the surface; but after a few days the salt works into the fig, and gives it a peculiar appetizing taste, counteracting the excessive sweetness, which else would be too predominant. I have examined the best Smyrna figs microscopically, and I find that the white floury substance which on old figs covers their whole surface is entirely due to uncrystallized grape sugar sweated out from the fig and to small crystals of rock salt. I believe that in Smyrna when the box is packed, and before it is pressed, the whole box is immersed in salt brine, so that the latter will fill all the pores and crevices between the figs, and thus kill any possible insect eggs and germs of fungus or bacteria deposited on the fig, which would cause them to become wormy and spoil. In opening fig boxes I have often found the sides covered with the white incrustations of salt.

The heavy pressing of the figs, which is always so strong that it causes them to burst at the stalk end, is much objected to by the consumer, as it evidently defaces the fig. But, nevertheless, this compression is absolutely necessary. It prevents insects from entering between them, and it prevents the air entering, thus drying out the fig. Observation and practice have shown this to be the case.

As my own crop this year has not been sufficient to place the same on the wholesale market, I have not pressed them as much as they otherwise should have been pressed, and my object was to keep the figs more intact.

Drying of figs in California, with the exception of before-mentioned cases, has not received much attention, principally because it was thought that we had not the true drying varieties.

The most successfully-dried figs (with the exception of those by Dr. Eisen) were prepared by Mr. Burnham, of Riverside. This is a small

fig, and according to Dr. Eisen is the White Marseilles. Mr. Burnham picks his fruit from the tree when it is wilted, and while yet green treats it to a strong sulphur bath, and then puts it in the sun to dry. When of sufficient dryness it is put into sacks to sweat, after which it is packed into small boxes.

The ordinary way of drying figs in California is very simple: Straw is spread on the ground under the trees, so that the fruit may drop without becoming soiled. It is picked up as it falls, and dried on trays in the sun. When supposed to have reached sufficient dryness it is put in heaps to sweat, after which it is packed into small drums or pressed into boxes. Compared with first-class dried fruit, these figs do not command high prices.

ARIZONA.

The fig will doubtless prove well suited to large portions of central and southern Arizona. The tree wherever planted develops rapidly.

About the gardens of Yuma the fig has been planted for some years, the tree growing rapidly. As regards their actual bearing we could get no exact statement, but persons growing them stated that they had borne well the third year. At the time of our visit (October) there were young figs forming, the second crop having ripened.

In Salt River Valley the fig is said to bear two crops regularly, and sometimes three. (This is in the case of the Mission fig.) The dry climate would make sun-drying a very easy matter.

POMEGRANATE.

(*Punica granatum.*)

This bush seems to flourish from one end of the State to the other, being met with in nearly every garden on the coast. Exposed to the raw sea-winds it does not set with fruit, and is best adapted to the warmer regions of the interior, where it is an early and abundant bearer. Although sold in our markets, it is not very much in demand except for certain classes of people. The Mexicans and south European population are the chief consumers.

The variety chiefly cultivated is a bright orange color, but there is found a large variety of them varying from almost pure white with a faint blush to dark red.* The largest collection that we have seen was growing on the grounds of Mrs. Arnerich, near Los Gatos, Santa Clara Valley; they all seemed to reach perfection on the gravelly soil here, receiving some irrigation.

In Arizona we find the pomegranate perfectly at home, being found in many gardens in various parts of the Territory.

* The darker-colored varieties, so far as I have seen, are the sourer, and make a very nice drink, like lemonade, by crushing the interior part in water. (E. H. VAN DEMAN.)

PRICKLY-PEAR, TUNA.

(Opuntia vulgaris.)

This large species of cactus is found considerably about all the missions of the State, where they were planted chiefly as a hedge plant. Originally brought from Mexico. The fruit, which is the size of a good-sized pear, is of a pleasant, subacid flavor, but owing to the care necessary to skin it to take off the minute prickles, few people except those "to the manor born" take to them. The fruit ripens in September, and can be found on all the fruit-stands in Los Angeles.

THE CAROB.

(Ceratonia siliqua.)

The following extracts are from the writer's report on Economic Plants and Trees cultivated at the Experimental Grounds at Berkeley:

"In the reports of this Department (horticultural) reference has been made to this most useful tree, and in that of the year 1884 a full discussion of its merits was made, to which we now refer the reader. During the last two years the growth of the young trees on the grounds has been very satisfactory, the oldest specimen in the garden of economic plants having grown at the rate of 3 feet a year without a particle of irrigation. The condensed reports given below are, for the most part, very satisfactory; but some of the most interesting points have been obtained during last summer, while I was traveling in the interest of the State Board of Horticulture. I am very much gratified to find at the base of the hills south of Los Gatos a number of trees in a flourishing condition. The place belongs to Mrs. Elizabeth Arnerich, a widow of a Dalmatian gentleman, who brought the seed with him from Dalmatia a number of years ago, when returning from a visit to his native country. The seed was planted the next season (1873) in boxes, and set out the following year in various places on the ranch, mostly on a red gravelly soil which during midsummer becomes dry to quite a depth. There are in all some 25 trees scattered about. Most of them have been moved once, and have, for this reason, been set back a number of years. The best trees are about 12 feet high, with a stem diameter at the ground of about 8 inches. A few of these trees commenced bearing fruit in 1885, and several of them have a number of pods on them this year (1886), although from the abundance of the blooms a good many more were expected. The trees, although not irrigated, present a striking appearance compared with other trees, such as figs, plums, etc., their glossy green indicating their superiority in resisting drought, while the other trees gave unmistakable evidence of the want of moisture in the ground.

"We thus have proof that the carob will grow with less water than any other fruit-tree, the olive tree not excepted. This demonstration

is just what we have desired, and it warrants us in recommending the tree for general trial in this State.

"It will be remembered it is by grafting and budding only that superior varieties are propagated and the tree brought into early bearing. Mrs. Arnerich had made several attempts to get grafts, but owing to poor packing had failed. She showed a sample of the variety that could be obtained from Dalmatia. The pods were larger than any I have ever seen, being fully 10 inches long.

"The case of the carob tree at James Shinn's nursery (Niles, Cal.), coming into bearing has been mentioned in the previous report. This year the tree showed a large increase in yield, although a number of pods dropped off just after setting, which was probably caused by a little too much moisture in the ground. Judging from the two instances, the outlook for successful carob-growing seems very bright."

PISTACHIO.

The *Pistacia vera*, or pistacio-nut tree, is a small tree of spreading habit of growth. The nut is known also as green almond, owing to the kernel having this (for a seed) exceptional color. They are eaten raw or roasted, while large quantities are used in candies. Our own experience, as well as the experience of others, shows this tree to be a very slow grower in this State, although thriving better in the hotter part of the State. The largest plants we have met with are at the nursery of James Shinn, of Niles, Cal., and are more of the nature of a bush than of a tree. Although several years old, they are but 6 to 8 feet high.

The pistachio should be set out permanently when it is small, as it is difficult to transplant when older, owing to the very long tap-root. To encourage growth of this tree it may be grafted on the *Pistacia terebinthus*, a tree that has proved very well adapted to the State.

LOQUAT.

(*Eriobotrya Japonica*.)

The loquat, incorrectly known in the southern States as "Japan Plum," is planted extensively in the gardens all through California, but has generally been considered as merely ornamental. In no case are we aware of its being planted as an orchard tree. It is perfectly hardy in the coast region, at least from Marin County southward, but blooming as it does during the coldest season, it is not apt to set fruit excepting in comparatively frost-free localities. To do well, it requires in general, some irrigation, the foliage and fruit thereby growing much larger. The flowers, growing in umbel-like clusters, are small, white, and inconspicuous. The fruit is elongated in shape, and when well grown 2 inches long, of a pale-yellow color. The flavor is peculiar, combining that of the tamarind and pine-apple, and is highly agreeable. A

person upon tasting it wishes there were only more of it, the seeds taking up the largest portion of the fruit. It begins to ripen in late spring, continuing for several months. The most successful yield which has come under our notice was at Mr. James Shinn's nursery, in Niles, Alameda County. Here a number of trees, now thirteen or fourteen years old, have been bearing abundantly for several years, producing from 25 to 30 pounds each every year. The fruit has found ready sale, and, as Mr. Shinn informs me, has been bought chiefly by the Chinese. There is no question but that the loquat will bear well in many portions of the State—all through the thermal belt of our coast valleys. The trees seem to be but slightly subject to the attacks of insects. In Los Angeles, Santa Barbara, and San Diego counties the loquat has fruited, and when better known will prove quite profitable. As there is much variation in the seedlings of this fruit, a variety with a small seed should be selected and propagated from by budding. The loquat does not seem particular as to the soil in which it grows.

NEW MEXICO.

The only three species of fruits coming under the head of semi-tropical which have been tried in New Mexico, as far as I have been able to learn, are the olive, the fig, and the pomegranate. With other semi-tropical fruits experiments are going on, but according to my informant, Maj. W. H. H. Llewellyn, of Las Cruces, the above are the only ones of which there can be formed an opinion yet. They are all grown in the lower valleys of southwestern New Mexico.

The olive has only been tried in an experimental way. For two years it has been growing in south Doña Ana County at an elevation of 3,800 feet, and has proved hardy so far. The stock was imported from France. The trees are not irrigated.

The fig has also been growing in Doña Ana County, in the same locality as above, for the last thirty years, and is there a perfect success. The variety cultivated is the so-called Mission, and ripens in September.

As might be expected, the pomegranate has proved hardy in New Mexico, and the fruit ripens in September. The variety is the common red.

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DEPARTMENT OF AGRICULTURE.

DIVISION OF POMOLOGY.

Bulletin No. 2.

REPORT
ON
THE ADAPTATION
OF
RUSSIAN AND OTHER FRUITS
TO THE
EXTREME NORTHERN PORTIONS OF THE UNITED STATES.

PREPARED UNDER THE DIRECTION OF THE COMMISSIONER
OF AGRICULTURE.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1888.

Compliments of

Norman J. Colman,

Commissioner of Agriculture.

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LETTER OF SUBMITTAL.

SIR: The report which I herewith send you has been made with the utmost caution after having personally inspected many of the orchards in Iowa, Wisconsin, Minnesota, and more eastern States, where Russian fruits have been growing for many years. I trust that it may serve the purpose which you had in mind when you delegated me to undertake the work.

Very truly, yours,

T. T. LYON,
South Haven, Mich.

Prof. H. E. VAN DEMAN,
Pomologist U. S. Department of Agriculture.

LETTER OF TRANSMITTAL.

SIR: In obedience to your orders, the following report upon the subject of Russian and other fruits in the Northern States, has been prepared, and is herewith respectfully submitted for the information of those who are especially interested in the cultivation of fruits in the extreme northern portion of the United States.

Horticulturists in those sections have long sought after varieties of fruits which can be grown there successfully, and it is hoped that this report, prepared by one of the oldest and most expert pomologists in the country, will be found of interest and value, and that it may be of benefit to the cause of practical pomology.

Very respectfully,

H. E. VAN DEMAN,
Chief of Division of Pomology.

Hon. NORMAN J. COLMAN,
Commissioner of Agriculture.

THE ADAPTATION OF RUSSIAN AND OTHER FRUITS TO THE EXTREME NORTHERN PORTIONS OF THE UNITED STATES.

CLIMATIC INFLUENCES.

At the extreme east, Maine stretches northward as far as latitude $47^{\circ} 32'$, while adjacent, at the west, New Hampshire reaches $45^{\circ} 11'$, and Vermont and New York extend only to 45° . Still, as the distance from the ocean increases, and the elevation is also necessarily increased, the extremes of both summer and winter temperature become greater, while the rain-fall is preceptibly diminished.

From eastern New York westward, the north line of the United States drops rapidly down to the region of known and successful fruit culture, and seems not to require discussion for the present purpose till we reach Michigan; along the easterly shore of which State the national boundary trends almost directly northward. Still the climatic influences are so far modified by the adjacent waters that, throughout what is known as the lower peninsula of Michigan, almost without exception, the climatic peculiarities likely to affect the culture of at least the hardier fruits compare favorably with those of central New York and southern New England. Such climatic conditions do not undergo essential change till after passing to the upper peninsula, about latitude 46° ; and not fully, even then, till after passing westward of the more direct influence of winds from off the waters of lakes Michigan and Superior.

Throughout the Michigan portion of the northern peninsula the influence of the waters of Lake Superior is unmistakably felt in the temperature of the winds coming across them; while they may doubtless be assumed to exert a very considerable influence upon the climate of northern Wisconsin, so far especially as northerly and northeasterly winds are concerned.

Passing westward from Lake Superior, Minnesota extends north to the national boundry in latitude 49 degrees, as do also the Territories of Dakota and Montana, east of the Rocky Mountains, as well as Idaho and Washington Territory upon the Pacific slope.

As we pass westward, beyond the influence of Lake Superior, the climate undergoes a gradual modification beyond that chargeable to mere increase of latitude, becoming subject to the unmitigated influence of polar storms in winter, with their extremes of cold; and, in turn, in

summer, to the dry atmosphere of the Plains, with increased liability to droughts, which not infrequently are of extreme severity.

The diminished percentage of atmospheric moisture westward of the Lakes is also very noticeable, becoming less as we pass westward till we approach the crests of the Rocky Mountains, beyond which, in Idaho and eastern Washington, similar conditions of dryness exist, till we reach the Cascade Mountains—a continuation of the Sierra Nevada range—west of which a mild climate occurs, with a copious rain-fall.

In Idaho, irrigation is believed to be more or less important to successful fruit culture, since by means of this the business becomes, to some extent at least, independent of climate. In eastern Washington the general conditions are understood to be similar to those of Idaho, although in both the general temperature is milder than in the same latitude east of the Rocky Mountains, while as we approach the Pacific extreme cold rarely if ever occurs.

Fruit culture west of the continental divide, in the latitude of Idaho and Washington Territories, is yet in an undeveloped state, and the capacities of these regions in this respect are but imperfectly understood. The discussion of the subject will therefore be mainly confined to the regions eastward of the Rocky Mountains. Westward of Iowa and Minnesota very little is yet certainly known respecting the adaptation of the country to the cultivation of fruits, except perhaps in eastern Nebraska, where the pomology assimilates closely with that of northern Missouri and Iowa. The probabilities, therefore, so far as the regions farther west are concerned, will be mainly expressed by results in the States of Iowa and Minnesota.

FRUITS ADAPTED OR ADAPTABLE TO A NORTHERN CLIMATE.

Of the fruits more or less perfectly adapted to successful cultivation in the region under consideration it will only be necessary to consider those which are, or promise to be, of value either commercially or for domestic or culinary purposes. Among these, named as nearly as practicable in the order of their maturity, will be found the Strawberry, Raspberry, Dwarf Juneberry (Serviceberry), Cherry, Currant, Gooseberry, Blueberry (including the Huckleberry), Blackberry (including the Dewberry), Mulberry, Cranberry, Apricot, Plum, Peach, Apple, Quince, and several nuts.

THE STRAWBERRY.

This fruit is said to be indigenous as far north as Behring's Straits, and is successfully grown in all the settled parts of the region under consideration. Few other fruits, however, vary so greatly under changes of soil and climate, so that the success of a variety in a given locality can only be certainly ascertained through actual trial. Experience, therefore, must necessarily be the surest guide to the choice of varieties for a given locality. No better rule can probably be devised for the selection of varieties for an untried locality than to select those

that most nearly approach the native type in character, and especially in hardiness of their foliage, since such may be expected to better withstand the hardships of this northern climate; although even these will doubtless require the shelter of mulch during winter, unless the snow shall suffice for the purpose.

Probably in no other class of fruits has there been a more utter blending or mixing up of original classes or families by continued cross-fertilization. Hence there must necessarily be much difficulty in the selection of pure varieties for additional crossing, as well as uncertainty in the selection of desirable varieties for planting from the indications of their foliage. Still, a thick, coriaceous foliage may in this, as in the larger fruits, be fairly assumed to indicate ability to withstand extremes of temperature, as well as of aridity.

It is also highly probable that the necessity which, in case of the tree fruits, has compelled a resort to reproduction for the origination of varieties capable of withstanding the trying climate of the extreme North, will be found more or less desirable in the case of the strawberry; since, although indigenous, it naturally occurs in sheltered situations, while under cultivation it is usually void of such protection.

At the East there are few, if any, indications of essential differences of experience between the northern and southern portions of New England so far as the varieties of the strawberry are concerned, although it may fairly be assumed that protection, either by mulch, or by a covering of snow, will become more and more essential as we go northward, while, other circumstances being equal, the same varieties will, as the rule, be found similarly successful in both regions.

At the Northwest, however, the diversity, as well as the severity, of the climate is far greater, to which may be added the fact that throughout much of this region there is practically little experience upon which conclusions may be based.

The reports and recommendations of growers in these regions, moreover, afford indications that they are made mainly from the market standpoint of mere profitableness, rather than from that of the grower for family or amateur purposes. Be this as it may, the varieties most highly commended for planting throughout the region are almost exclusively those more generally commended elsewhere by growers for the market.

Selecting from these the twelve most generally recommended for planting in Wisconsin, Iowa, Minnesota, Dakota, and westward, their relative popularity is found to be, as nearly as may be, in the following proportions: Crescent, 35; Wilson, 19; Glendale, 12; Charles Downing, 11; Manchester, 10; Phelps (Old Ironclad), 10; Vick, 8; Captain Jack, 7; Downer, 7; Cumberland, 4; Countess, 3; Kentucky, 2.

The fact that occasionally the Crescent (usually considered pistillate) is the only variety recommended in many cases, thus leaving it destitute of a pollen-supplying variety, would seem to justify the suspicion that the recommendations may not in all cases have been made

with due deliberation; while the notable omission of varieties generally recognized as representatives of quality, and hence adapted to supply the requirements of discriminating tastes, may be supposed to indicate a too-general control of the societies in the regions in question by purely commercial growers.

In Minnesota the growing of this fruit for market purposes has been found profitable as far north as Moorhead and Glyndon, about latitude 47 degrees north, where a seedling has been originated which proves so valuable, that it has received the name Manitoba Wonder.

THE RASPBERRY.

Of this fruit, two native species only—*Rubus strigosus* and *R. occidentalis*—are recognized as possessing economic value, so far as their fruits are concerned. The European *R. Idæus* is found to be incapable of withstanding the extreme heat, cold, and aridity of most American climates.

Strigosus, in its wild form, exists in abundance from the Great Lakes to the sea-board and northward, where it is generally protected against extreme cold by an ample covering of snow.

Philadelphia, Clarke, Herstine, Cuthbert, Hansell, Superb, Turner, and Marlboro, supposed to be seedlings of this species, and also various others, some of which are partially or wholly of *Idæus* parentage are, or have been, more or less popular. Those of native origin may be expected to prove more or less successful even upon the Western plains, with irrigation where moisture is deficient, and with artificial protection where snow is uncertain.

Occidentalis has a more limited range northward. Its stronger and taller growth subjects it more fully to the influence of extreme cold, while its less flexible canes render its artificial protection more difficult. It can scarcely be expected to succeed at the extreme North, except by the employment of effective means for winter protection.

With this precaution, almost any of the popular varieties, such as Doolittle, Souhegan, Tyler, Ohio, Hopkins, Gregg, and many others, may be expected to prove reasonably successful.

There is also a class of varieties, among which are New Rochelle, Shaffer, and others, possessing the habit of *occidentalis*, but with fruit in color and quality intermediate between this and *strigosus*, which, by many are supposed to be hybrids, and which may be expected to succeed at the North under treatment similar to that suggested in the case of *occidentalis*.

The varieties of this fruit relied on at the extreme North are mainly those which are also popular farther South, although several seedlings of the region are locally commended and planted. At Menominee, Wis., on the northwesterly shore of Green Bay, report says that all raspberries must be covered in winter, while at Stonewall, Manitoba, Mr. Thomas Frankland, of that province, states that black-caps are grown without protection. This, if true for that locality, must very probably be due to an ample covering of snow in winter.

The popularity of varieties, as indicated by reports of societies and the commendations of growers, is expressed in the following figures:

Blackcaps.—Gregg, 10; Doolittle, 7; Tyler, 7; Mammoth Cluster, 6; Souhegan, 4; Nemaha, 2; Ohio, 2; Golden cap, 1; Beebe's Golden, 1.

Varieties of strigosus.—Turner, 23; Cuthbert, 14; Philadelphia, 6; Marlborough, 5; Hansell, 4; Brandywine, 3; Crimson Beauty, 2; Thwack, 1; Reliance, 1; Clarke, 1; Superb, 1.

Supposed hybrids.—Shaffer, 9; Caroline, 1.

DWARF JUNE BERRY.

The dwarf juneberry (*Amelanchier canadensis*, var. *rotundifolia*), occasionally known as service berry or shad bush, is occasionally planted, and has been, by some persons, sold to planters as blueberry or huckleberry, to which the fruit has considerable resemblance, although far less desirable so far as productiveness and quality are concerned.

The plant is of easy cultivation, and entirely hardy, being indigenous at the extreme North. In one of its forms it becomes a tree 20 to 30 feet in height. In this form the tree is usually less productive and the fruit smaller.

Professor Budd, in 1886, states that while it is a great favorite with birds, "when grown in large quantities, say 2 or 3 acres, what the birds will take will hardly be missed; but in small lots it will probably not be profitable. * * * We have at the college about twelve distinct species, from Germany, Central Asia, and Russia. They are all small, from 2 to 4 feet in height, and some of them very fine."

THE CHERRY.

Our improved varieties of the cherry are reputed to have sprung from a wild species, botanically known as *Prunus avium*, which is supposed to have been the parent of our modern Heart, Bigarreau, and Duke varieties, and from *Prunus cerasus*, from which are supposed to have originated the Morellos.

The former can not be considered hardy, either north or west of southern New England and New York, and only partially so in southern Michigan; while from one cause or another the entire class utterly fails farther westward and northward.

The Morellos, which in average seasons have been at least partially successful in the latitude of northern Illinois and central Iowa and to some extent even farther north, were sadly injured during recent trying winters, compelling the conviction that for the regions northward and westward their failure may fairly be deemed a foregone conclusion, except, perchance, in specially-favorable localities.

Within comparatively a few years several varieties, among which may be named Leib, Ostheim, Wragg, and perhaps others, have been put forward as having successfully withstood these trying paroxysms, and for this reason have attracted much attention. Upon inquiry, several,

if not all, of these are reputed to have been incidental importations from central or eastern Europe, and to have inherited their hardiness from the typical varieties of those regions.

Under these circumstances the Iowa Agricultural College, through J. L. Budd, its professor of horticulture, made a careful study of the cherries of central and eastern Europe during the summer of 1882, together with comparisons of the climate with that of Iowa and the adjacent regions.

Becoming assured that certain of the typical cherries of Silesia, Poland, and southern Russia were superior in quality to those heretofore successfully grown in Iowa, and, moreover, that the similarity of climatic conditions warranted the hope that they would also prove successful here, and also, upon similar comparison, that certain varieties or types of this fruit from Vladimir and Kazan, still farther north, might be expected to withstand the climate of central and northern Minnesota and Dakota, during the spring of 1884 about forty varieties of cherries were successfully imported from those regions, planted in orchard at the college, and their propagation commenced for the purpose of distribution and trial in the Northwest.

It is by no means warrantable to assume, in advance of thorough trial, that these novelties are to be relied on to supply the existing need, although a very recent examination, not only of the original trees planted in the orchard at the college, but also of those now in nursery there, made since the extreme heat and drought of the past summer (1887), shows their growth to have been strong, while the rich, glossy foliage was as healthy and perfect as could be desired, thus pretty thoroughly demonstrating the fact of their sufficient hardiness in this latitude, together with their ability to resist the depletory influences of extreme aridity.

The effect of the change of ten or fifteen degrees of latitude upon their productiveness, and possibly even upon the quality of the fruit, can only be certainly determined by their actual fruitage through perhaps a series of years.

Uncertain as the result of this experiment must, so far, be considered, it seems to offer the chief apparent prospect for a home supply of this desirable fruit for the extreme North and Northwest east of the continental divide.

Of the varieties thus imported and on trial on the college grounds, Professor Budd lists and describes Vladimir, Bessarabian, Lutovka, Nos. 23, 24, 26, and 27, Orel; the varieties given by numbers being of the Bessarabian race.

Another class of varieties, which are designated as the Ostheim Weichsel family, includes Strauss Weichsel, Frauendorfer Weichsel, Susse Früh Weichsel, Späte Amarelle, Griotte Précoce, Griotte Douce Précoce, Griotte de Ostheim, and Cerise de Ostheim.

He also describes the following as being of mixed race: Brüsseler Braune, Schatten Amarelle, Königliche Amarelle, Vilna Sweet, Doube

Natte, Amarelle Bunte, Fouché Morello, Herzog's May, Herzformige Weichsel, Lithauer's Weichsel, Sklanka, Red May, Red Muscateller, June Amarelle, Amarelle Bouquet, Griotte du Nord, Grosse Lange, Double Yellow Spanish, Glaskirche Kurzstielige.

While the professor deems it probable that several of these may not succeed above the latitude of southern Iowa and northern Illinois, he is yet of the opinion that others will prove hardy enough for central and even northern Wisconsin, Minnesota and Dakota—a region in which the only indigenous representatives of this fruit are the worthless Sand or Mountain cherry (*Prunus pumila*) and the Choke cherry (*P. Virginiana*).

The most successful variations of this fruit in the settled portions of the Northwest, as indicated by the reports of societies and the preferences of planters, are indicated by the numbers attached to names of varieties, as follows :

Early Richmond, 11; English Morello, 9; Wragg, 5; Ostheim, 5; Late Richmond, 3; Montmorency, 3; Vladimir, 1.

Dr. T. H. Hoskins, of northern Vermont, in the American Garden, says :

"The Kentish cherries, early and late, with several of the Dukes and Griottes (Mazzards) endure even our hard winters, and sometimes become quite large trees, yet rarely produce a full crop of fruit. * * * We are hoping much from the recently-imported Russian, Polish, and north German cherries and plums; but in order to get high quality, in addition to hardiness of tree and bud, the same work of crossing may be necessary as in the cases of the pears and apples. That good results can be realized in a reasonably short time in such experiments has been frequently proved; and a great field is open for those rightly situated, who will enter upon the work seriously and follow it up perseveringly."

THE CURRANT.

Both the Black currant (*Ribes nigrum*)—a native of northern Europe and Asia—and the Red currant (*Ribes rubrum*)—a native of northern America—will doubtless be found abundantly hardy at the extreme North; at least when given a shady location, and assisted by irrigation in regions in which moisture is deficient. Both are of extreme northern origin, and will doubtless be found proof against injury from low temperatures.

The Missouri Currant (*Ribes aureum*) is valued chiefly for ornamental purposes. It is found wild in Kansas, and also as far northward as Dakota, and if not indigenous, it must have been introduced there at a very early period.

The white currants are considered to be mere varieties of the red currant.

Naming them in the order of their apparent popularity, numbers are attached to indicate the relative values, as indicated by reports and discussions :

Red Dutch, 13; Fay, 12; White Dutch, 9; White Grape, 9; Victoria, 9; Cherry, 7; Long bunched Holland, 6; Black Naples, 5; Stewart, (a local seedling), 2; Lee (black), 1.

THE GOOSEBERRY.

This fruit, also known botanically as *Ribes*, is essentially American and northern in its habitat; appearing on this continent under several forms. The single English species *Ribes reva-crispa*, so generally grown in England as a garden fruit, is believed to be the only species of European nativity. It proves unable to withstand the heat and aridity of our American climate. In the cool, moist climate of England it has sported into a great number of varieties, some of which are of very large size.

Comparatively slight improvement has, so far, been effected with those indigenous to America. Among the improved varieties from this source are Houghton and Mountain seedlings. Downing and Smith are more recent originations, of larger size; which give indications of a possible hybridization with the European species.

Industry is a very recent introduction to American growers. It is an alleged seedling of the European species; but is said to be so much less liable to mildew, as to warrant the hope that it may prove adapted to this climate. Its permanent exemption is, however, still a matter of doubt.

Even the purely native Houghton occasionally, under unfavorable conditions, is found to suffer from mildew; which is the chief obstacle to the success of the European species here.

The improved natives, including Downing and Smith, are abundantly hardy in central Minnesota; although at Minneapolis the Downing, for some cause not understood, has shown a lack of productiveness. There can, however, be little doubt of the success to the American varieties at the North and West, if grown in shaded situations, with the requisite conditions of coolness and moisture. Houghton, Downing, and Smith are the varieties which seem to be more generally popular. The gooseberry is now, however, extensively grown in the Northwest.

THE BLUEBERRY.

The Blueberry (*Vaccinium*) (which formerly included the Huckleberry, now *Gaylussacia*), is so peculiarly exacting as to soils and surroundings, that but rare, and generally ineffectual, attempts have been made to subject it to cultivation and improvement; although few of the smaller fruits are more highly valued where it is known and accessible. It is essentially a Northern plant, and the fruit is abundantly produced in the region of the Great Lakes, and eastward to the sea-board.

Some, at least, of the various species occur farther west, in localities in which suitable soils and other needful conditions occur.

THE BLACKBERRY.

The Blackberry (*Rubus villosus*) and its near relative, the Dewberry, (*Rubus canadensis*) are indigenous throughout the northern States, gen-

erally in partially-sheltered locations, or in tracts of land but recently burned over.

From such localities immense quantities of this fruit annually find sale in the markets of large cities and towns. The fruit thus so produced has been so abundant that, until recently, little attempt has been made to improve it, and this little mainly by selection of choice seedlings. A few of those most likely to prove hardy enough for the North and West are Snyder, Taylor, Stone, Wallace, Western Triumph, Ancient Briton, and perhaps a few others.

The habit of the plant is to produce its fruit-buds for the ensuing crop near the top, where the injury in winter is most likely to occur, with the frequent result of a partial, or possibly of an entire, loss of the crop of fruit. Even the so-called hardy varieties are by no means entirely exempt from such loss when fully exposed during winter. In fact, when it is recollected that the blackberry is naturally an undergrowth, we may be allowed to doubt if, with the habit of fruiting already mentioned, there is ground for hope that a variety capable of withstanding a full exposure during occasional crucial winters is even among the possibilities.

If in the more moist and equable climate of the region of the Great Lakes it is found practicable and profitable to protect the fruiting canes in winter, there must doubtless be increased occasion for such practice in the drier atmosphere and severer winter temperatures farther west and north, where quite probably, even with the hardiest varieties, the plants may require to be well covered with snow, mulch, or earth, to avoid the alternative of a loss of the crop of fruit. The low spreading habit of the Taylor, Stone, and perhaps others, is advantageous for such purpose; while the stout upright growth of many others increases the liability to break the canes in the process of laying down.

The trailing habit of the dewberry would, in a snowy region, insure an ample covering; while, if needful, they may be easily covered with earth or mulch.

There are several varieties before the public; but of those disseminated and fully tested, the Lucretia is the only one that has received general and satisfactory indorsement.

The following varieties are more or less grown in the Northwest; the numbers indicating their relative popularity:

Blackberries.—Snyder, 21; Ancient Briton, 11; Stone, 7; Taylor, 2; Thornless (?), 2; Kittatinny, 1; Wallace, 1.

Dewberries.—Lucretia, 4, and a local seedling yet unnamed, discovered by Dewain Cook, of Windom, Minn.,* 1; also one recommended at Sparta, Wis., as productive and excellent, 1.

THE MULBERRY.

The Black mulberry (*Morus nigra*), said to have originated in Central Asia, and to have been introduced into southern Europe more than a

* This variety has recently been named Windom.—H. E. VAN DEMAN,

thousand years ago, is reputed to be the parent of what is now known as the Russian Mulberry, which is the only species requiring notice in this connection.

Having been introduced into the West by the Mennonites who emigrated from Russia, it has manifested a degree of hardiness superior to that of any other mulberry. Its limit northward on this continent can not yet be said to have been determined.

The fruit can not be said to possess any special present value, and its prospective importance must depend upon the chance of improvement by new originations from seed. Even in this direction the probability of improvement is apparently very remote.*

THE CRANBERRY.

The Cranberry (*Vaccinium macrocarpon*) belongs exclusively to the North, where it assumes much importance as a commercial fruit. It is largely grown for market from New Jersey northward to and including the British provinces. The business in New Jersey and Massachusetts is mainly confined to the sea-coast.

Michigan, Wisconsin, and Minnesota possess superior natural advantages of both soil and climate for the purpose; and, although in these States the interest is less fully developed, the production of this fruit here is being rapidly increased.

Many marshes throughout both peninsulas of Michigan were naturally well stocked with the cranberry; and, although during the settlement and development of the State many of these have been drained and converted into arable land, large tracts are still in their pristine condition. In Berrien and Ottawa Counties, and probably elsewhere, considerable tracts have been prepared and stocked with the vines with profitable results, and the business seems likely to increase.

Probably the most extensive plantations are to be found in Wisconsin. It is estimated that in four counties in the central part of this State there are fully 50,000 acres of marsh adapted to the growth of this fruit, much of which is already in process of improvement for this purpose. The usual process here seems to be to clear the ground of brush, and by partial drainage to enable the plants to take possession of the soil, which they are said to do within a comparatively short period, thus avoiding the expense of preparing and planting the ground and cultivating till the plants have covered the surface.

A tract of 1,080 acres, owned by a company who have already invested a considerable sum thereon, is being improved upon the following plan: At the upper side of the marsh a reservoir of ample capacity is created by digging a ditch across the slope (which is very slight), throwing the earth upon the upper side, thus constructing an embankment or dam, with sluices and flood-gates at convenient points, by means of which the water may be accumulated and turned upon the space below at pleasure.

*All of the many varieties I have observed in several Western States were too small and poorly flavored to be valuable except as bird feed.—H. E. VAN DEMAN,

Below, and at right angles with the embankment already spoken of, a ditch is dug nearly centrally through the marsh of sufficient capacity to receive the waste and surplus water. The earth from this ditch is used to construct an embankment upon each side thereof; and the water therein is maintained at a depth and width sufficient to float a small flat-boat, which is employed for transporting material, as well as for collecting the fruit when picked. The lower end extends to and within a building, which serves as a storage and packing room for the fruit when picked and awaiting transportation.

The marsh below the reservoir is cut up by side and cross ditches into blocks of five or more acres, each of which is capable of being separately flooded from the reservoir and ditches above by means of sluices, as already described.

When a new block has been prepared the sluices entering it are left open, and it is kept flooded during the growing season, with the result that the trees, shrubs, and bushes growing thereon are killed. The sluices are then closed, the trees and brush, if any, removed; and the cranberries that may be already thereon left to take full possession. In case of a block not sufficiently stocked with natural plants for the purpose, the ground is carefully fitted as for a farm crop; a lot of rooted plants are cut into sections, which are sowed and harrowed in, in the usual manner of farm-sowed crops; usually with a favorable result.

Little seems to be known respecting the status of cranberry culture in Minnesota, beyond the fact that the fruit is indigenous and abundant in its wild state, and that a very considerable amount is supplied to commerce.

That it is less abundant in the wild state in Dakota and Montana can scarcely be chargeable to unfavorable climate, but rather to a lack of the peculiar conditions of soil and moisture indispensable to the growth and prosperity of the plant.

Mr. E. Reeves, of Waverly, Iowa, in a report to the State Horticultural Society for 1886, page 152, says, "The Highland cranberry (*Viburnum opulus*) is not grown as much as it should be. It is a native of our part of the State and is perfectly hardy. It does best on a moist soil, is readily grown from cuttings, and bears good crops of fruit, nearly equal to that found in the markets."

The plant is indigenous as far north as British America, but is usually accounted but a poor substitute for that already described. This fruit, however, seems quite unlikely to become a competitor of the ordinary cranberry.

THE APRICOT.

The Apricot (*Prunus Armeniaca*), is reputed to be a native of Armenia, and to have been brought into southern Europe in the time of Alexander the Great.

Seeds of a species (or variety?) differing, at least in hardiness, from the varieties of southern Europe were brought to this country from

southern Russia by the Mennonites some years since. These have been generally reproduced in this country, and considerably disseminated as seedlings, which are found to vary greatly in quality. More recently some Western nurserymen have made selections from the best of these and have undertaken their propagation.

The apricot has hitherto proved to be so uncertain a fruit at the North, that a variety of even tolerable quality, that shall prove successful north of the Middle States, will no doubt be welcomed as an acquisition. It must, however, be admitted that the question of the value of this new introduction anywhere in this country or for any purpose is yet to be decided; while it can scarcely be hoped that it will succeed north of central Iowa, and possibly some portion of southern Michigan, where in favorable situations the more common varieties of this fruit fail more especially on account of very early blooming.

Professor Budd, of Iowa (who is by some persons thought to be occasionally excessively enthusiastic respecting the prospective value of Russian fruits), says in a bulletin of 1885:

We find not in Russia, however, any varieties of the apricot equal to their best plums. We believe the best apricots of the world, for our climate, are to be found in north Bokhara and northwest China, [adding] We are sending out for trial plants of a variety from the hill country northwest of Pekin, China, which seems specially promising for the parts of the West south of the forty-first-parallel.

Among those thus named, propagated, and catalogued are the following six varieties introduced by Carpenter & Gage, of Nebraska: Alexander, Alexis, Budd, Catharine, Gibb, and Nicholas.

The following additional varieties are believed to have been selected and introduced by A. H. Griesa, of Kansas, viz: Byram, Evatt, Preib, Remer, and Smith.

Although these have ostensibly been selected for propagation as stated, little is yet known of them beyond what is stated by their introducers. Their real value must depend almost wholly upon the results of extensive trial over an extended region.

THE PLUM.

The cultivated Plum of the Northern States (*Prunus domestica*), which, according to Dr. Gray, is supposed to have sprung from the Sloe, is an introduction from Europe. It proves hardy and successful from New England westward to and including the lower peninsula of Michigan, although almost universally attacked by the curculio, which usually ruins the fruit, unless efficient means are employed to save it.

The fruit is also, in many localities, attacked by what is known as "the Rot," which appears to be either accompanied or caused by fungus, which manifests itself in connection with the decay, which usually occurs just prior to the season of maturity, often ruining nearly or quite the entire crop of fruit.

The foliage is also frequently attacked, toward the end of summer,

by a malady which causes the premature ripening and dropping of the leaves, leaving the fruit but partially grown and the wood yet immature, in which case the tree is often either injured or killed by the cold of the following winter. By some persons this malady also is attributed to the attacks of a minute or microscopic fungus, although no sufficient examination is known to have been made to determine the question.

The branches, and occasionally even the trunk, of the tree are also liable to be attacked by a fungus known as Black Knot, and botanically as *Sphaeria morbosa*, which occasions unsightly protuberances, and, if neglected, is quite sure to ruin the tree, but which may generally be overcome by the prompt cutting away and burning of the diseased parts, to prevent the dissemination of the spores.

These various maladies have proved so serious, that in many localities once considered favorable, the growing of this species of plums has been nearly or quite abandoned; although in the northern portions of lower Michigan, in portions of the more easterly States, as well as in Canada eastward of the Great Lakes, either from more favorable climatic influences or because the inducing causes have not yet reached them, this fruit is still abundantly successful; becoming in such localities not infrequently a very considerable source of revenue.

Farther westward, either from lower extremes of temperature or a more arid climate, or possibly from a combination of the two, this species of plum fails almost wholly.

The native plum of the South (*Prunus chicasa*), grows in the wild state in Kentucky and southwestward; and in those regions seedlings of this, among which may be named several known by the common title Wild Goose, have been found productive and profitable under cultivation. These have been tested at the North and found abundantly hardy; but, although they often bloom freely there, either from imperfection of the bloom or from other and unknown cause they almost invariably prove obstinately unproductive, and hence worthless, unless, as some have been led to hope, this defect can be remedied by the adjacent planting of other pollen-producing varieties—a hope which as yet lacks the confirmation of actual authentic experience.

The native plum of the North (*Prunus Americana*), is indigenous from about latitude 38° northward, far beyond the limits of the United States. It is quite at home in the lowest lands and along the margins of streams where the lowest range of the thermometer is known to occur. It is always abundantly, if not excessively, productive; and even in the regions in which the *domestica* varieties are most liable to the attacks of the curculio, this species mainly escapes; while in the specimens which bear the mark of the Little Turk, the larvæ very generally fail to develop.

D. B. Wier, of Illinois, advances the hypothesis, which he insists is borne out by his own experience in the growing of this fruit, that while the curculio freely punctures this class of plums, the larvæ very rarely develop; and upon this circumstance he bases the conclusion that the

growing of our native species would probably result in the extermination of the Little Turk.

Although this species in its wild state can not be said to be of high quality, its productiveness, hardiness, and freedom from disease, seem to have directed attention to it as a possible source of improved varieties. So far as is known, the only improvement as yet has been by selection. Even by this mode several desirable varieties have already been discovered; some of them, at least, possessing qualities which in value, nearly approach the popular varieties of the *domestica* species. Among these may be mentioned De Soto, Wolf, Rollingstone, and Wyant, which are on trial and being disseminated by the Iowa Agricultural College; also Miner, Bassett, Climax, Forest Garden, Rockford, and other promising newer sorts in process of propagation and introduction. To the foregoing may be added Weaver, introduced several years since, and Pottawatamie, now just introduced. The last two are said to be productive in Iowa, where they originated. In Michigan, with but a limited trial, Weaver shows a lack of productiveness.

There is little occasion to doubt the success of plums of this *Americana* species throughout the Northwest, at least eastward of the Rockies, except, possibly, where the failure shall arise from a lack of the needful moisture in the soil.

In his General Notes on Foreign Plums, in bulletin of 1882, Professor Budd says:

The varieties of really good plums, for dessert and culinary purposes, grown in Russia will be a matter of surprise to visitors. Even as far north as Moscow and Kazan plums of fine size and quality are grown in great abundance. We have introduced a number of fine sorts which we are propagating and sending out for trial. Their success with us will not hinge on their hardiness or tendency to produce fruit, but on their relative exemption from attacks of the curculio. We have much reason to believe that such sorts as the Red and Yellow Arab, Moldavka, Hungarian, Long Blue, Long Red, Long Yellow, and Skorospelka will not be injured by the Little Turk to a greater extent than our native sorts, as, like them, they start the fruit late, and it is developed with great rapidity. In no line of our experimental work do we expect more useful results than in our trial of the best Russian plums.

Although the foregoing was published more than two years since, it is not known that any of these plums have even yet fruited in this country. The effect, therefore, if any, of so wide a departure in longitude, and the probably more marked result of a transfer southward of 14° of latitude, are yet to be determined; and since the professor fails to clearly indicate the premises upon which his expectations have been based, there is no apparent alternative but to wait and hope for the desirable results which he seems so confidently to anticipate.

In the transactions of the Iowa Horticultural Society for 1886 the professor says:

Of the Russian plums which I am testing I can say but little as yet; some of them are of the Lombard type in appearance. Our native varieties seem to do well, such as Bassett, De Soto, Climax, Forest Garden, and Weaver. The last named does not seem very productive. The Robinson and Marianna I have not tried long enough to speak intelligently about.

In the same volume, at page 437, Mr. Burton advances the idea that—

The Miner plum [why not others also—WRITER] ripens its pollen before the stamen is ready to receive it. This difficulty could be obviated by planting another plum adjacent, which ripens its pollen at just the right time.

Some indication of the varieties of plums under cultivation in this region may be gathered from the following list. Their apparent relative popularity is indicated by the numbers attached:

De Soto, 29; Forest Garden, 17; Miner, 15; Weaver, 9; Wolf, 7; Wild Goose, 7; Rolling-stone, 5; Maquoketa, 4; Cheney (the earliest), 2; Newman, 2; Speer, 2; Marianna, 1; Robinson, 1; Harrison's Peach, 1; Moore's Arctic, 1; Van Buren, 1; Winnebago, 1; Rockwell, 1; Shaffer, 1; Lombard, 1; Shipper's Pride, 1; Clemmons, 1; Oglesby, 1. Several of these are recent introductions, and not generally known and tested.

THE PEACH.

The Peach (*Amygdalus Persica*) is reputed to be a native of Persia, and to have originated from the almond. The Nectarine is usually considered to be merely a variety of the peach with a smooth skin. It is known, in fact, that within a recent period certain existing varieties of the nectarine have been originated from seed of the peach.*

The limit northward of the peach-growing region proper at the East may be said to be about latitude 42°; although near the sea-coast, and also in New York and in portions of Ontario, the ameliorating influence of the ocean and of Lake Ontario carry it somewhat above 43°. Farther west, in Michigan, it extends yet farther north; within the more immediate influence of Lakes Michigan and Huron even as far as latitude 45° 30'. Farther west, and away from the influence of the Great Lakes, the limit of the profitable cultivation of this fruit occurs much farther south, probably even below latitude 40°, or in southern Illinois and northern Missouri.

At the northwestward of Lake Michigan the peach, therefore, can only be grown as an exotic. There have been various efforts to devise some cheap and effective process for the protection of the tree against the extremes of cold during winter, which occasionally ruin the fruit-buds and even the trees. So far, however, nothing effective has been devised short of actually laying down the trees and covering them with earth during the winter.

Prof. J. L. Budd, in the course of his experiments with hardy European fruits, has imported from eastern Asia what he hopes may prove a hardier type of this fruit. In a college bulletin issued in 1885 he says:

The peach does not vary as much in hardiness of varieties as the other orchard fruits of the temperate zone. In our experiments we have used the Wager and Hill's Chili as a standard of hardiness of the old varieties, coming originally from Persia.

* This I have done repeatedly on my own farm in Kansas.—H. E. VAN DEMAN.

Four years ago we imported plants of eleven varieties of the peach from Pekin, China, they having been procured for our use from the hill country northwest of Pekin. They have larger, thicker leaves than our common sorts, ripen their wood earlier in fall, and have proven 30 per cent. hardier than our old sorts. Plants we have sent out for trial have stood well in south Iowa, north Missouri and Kansas. Some of them will prove valuable on the northern borders of the peach belt.

Two years ago we received pits of the peach from Riga, Russia, said to have been brought from Central Asia. The plants are now two years old, and show marked variation in leaf, bud, glands of leaf, and habit of early ripening of wood, from the old varieties originally from Persia.

We are now trying to secure pits from north Bokara, in Asia, the most extreme climate, so far as I know, where the peach is grown. The most we expect to do in this line is to make peach-growing possible on the northern borders of the present peach belt.

A peach, said to be a native of China, and known as Tong-Pa, is reported to have been a couple of years on trial in Iowa County, in eastern Iowa; but with so short experience, no conclusion has yet been reached respecting its probable value for that locality.

Peter M. Gideon, of Excelsior, Minn., has a small plantation of bearing peach trees, planted with reference to laying down and covering with earth in winter. In August, 1887, these were in thrifty condition, and carrying some fruit; having apparently been three or four years planted, and from 8 to 10 feet in height.

THE GRAPE.

The Grape (*Vitis*) is represented in Europe only by the single species *vinifera*, although since the advent of the phylloxera in the grape-growing regions of that country importations of American species have been freely made, with the hope that, by their more robust habit, they may prove better able to resist the attacks of this new enemy. This species proves obstinately unsuccessful throughout the eastern United States. A very considerable number of our improved American varieties have nevertheless become tainted with this strain by hybridization, and many of these seem to have derived desirable qualities from this source; although generally, if not always, with increased tendency to suffer from mildew—the chief enemy of the *vinifera* class in this country.

Of our American species, *Vitis cordifolia*—the northern Frost Grape—is indigenous far northward of the United States. By modern botanists this is blended with or included in *riparia*.

Vitis labrusca—the indigenous wild grape of New England—becomes more rare as we proceed westward, occurring very rarely in western New York and Michigan; and, it is believed, wholly disappearing, as an indigenous growth farther west.

Vitis astivalis can only be said to be indigenous south of the region under consideration; though occasionally extending sporadically into its southern portions.

Within the past thirty or forty years, in the process of improving our native grapes by reproduction and bringing them under cultivation

while there yet remain many varieties which clearly represent the original species, these species have in many cases become so blended by hybridization, that frequently nothing short of an authentic history of a variety would suffice to assign it its correct specific position.

As the result of this blending and improvement, the resultant varieties have come to be planted indiscriminately throughout the region under consideration; reference being mainly had to their probable ability to mature their fruit within the season, and resort being had to protection in winter in regions in which very low temperatures are to be anticipated.

Vitis vulpina (rotundifolia), which includes the Scuppernong, also *candicans*, *cinerea*, *monticola*, *Novo Mexicana*, and *rupestris*, are Southern species, generally lacking hardiness at the North; few if any of them having produced varieties of value for Northern planting. The fact that Catawba and Isabella grapes, perfectly ripened in the open air at Excelsior, Minn., on the banks of Lake Minnetonka, were awarded a premium at the New Orleans Exposition, was a surprise to very many; since the former especially is not, with ordinary surroundings, considered sure to ripen fully north of latitude 39° or 40°.

That these varieties can be fully matured in the open air five or six degrees farther north, would indicate that the summers there are specially favorable for the purpose. A visit this year to the vineyard which supplied the specimens in question showed that it is favorably situated on dry, warm soil, sloping rapidly to the east and south, and that the cultivation and pruning were of the best and most effective kind, rendering the laying down and covering of the plants (which is indispensable here) easy and effective. Under only ordinary circumstances, however, many varieties were in an advanced stage of ripeness, and "Minnetonka grapes" were freely offered in the markets of Minneapolis and Saint Paul as early as the 18th of August.

That there is little difference between this region and those farther east so far as choice of varieties may be concerned, is clearly indicated by the following list, the relative popularity of each variety being indicated by the numbers attached to each, and the varieties being those recommended in the discussions of societies and the reports of committees:

Concord, 33; Moore, 27; Worden, 27; Delaware, 12; Pocklington, 12; Martha, 12; Janesville, 12; Agawam, 9; Lady, 9; Cottage, 8; Brighton, 7; Salem, 6; Telegraph, 6; Elvira, 6; Niagara, 5; Ives, 5; Dracut Amber, 5; Lady Washington, 5; Empire State, 4; Wilder, 3; Woodruff Red, 3; Coe, 2; Early Victor, 2; Perkins, 2; Vergennes, 2; Eunelan, 1; Barry, 1; Massasoit, 1; Lindley, 1; Champion, 1; Jessica, 1; Florence, 1; Hartford, 1; Crevelling, 1; New Haven, 1; Wyoming Red, 1; Northern Muscadine, 1; Clinton, 1; Marion, 1; Bacchus, 1; Black Hawk, 1; Black Eagle, 1; Beauty, 1; Red Fox, 1; El Dorado, 1; Jefferson, 1; Duchess, 1; Iona, 1; Rogers No. 33, 1.

The impolicy of the very common practice among the originators and introducers of new varieties of sending them out under numbers is strikingly manifest in the almost universal custom in the Northwest, in the discussions and reports of horticultural gatherings, to continue the use of the original numbers, sometimes coupled with the name, but quite frequently without such accompaniment, not only greatly to the inconvenience of the hearer or the reader of a report, but also with a greatly-increased liability to error consequent upon the use of figures.

It would, beyond doubt, inure greatly to the convenience of all concerned, if all societies could be induced, in cases in which names exist, to resolutely exclude the numbers from their discussions, and especially from the reports of their transactions.

THE PEAR.

The Pear of Europe and America (*Pyrus communis*) is indigenous in Europe and Asia. It had early been subjected to cultivation in Syria, Egypt, and Greece, and thence introduced into Italy during the early days of Rome. From this species comes the great mass of our modern varieties; although there are other species, among which are the Aurelian (*Pyrus salicifolia*), a native of France; the Snowy pear (*Pyrus nivalis*), a native of Australia, neither of which are represented among our cultivated varieties, and the Sand pear (*Pyrus sinensis*), a native of China and Cochin-China, from which, by hybridization with *P. communis*, the modern Le Conte, Kieffer, and others are *supposed* to have originated.*

Between March, 1879, and some time in 1884, Professor Budd, as the representative of the Iowa Agricultural College, made no less than twelve importations of pear trees or scions from different localities in Russia (including Poland) and Germany; also an importation from northwestern China.

The varieties included in these importations number sixty-three; although an uncertain number will probably prove to be duplicates. In publishing lists of the varieties thus introduced the professor remarks:

Our experiments with the pear mainly date from the time of our visit to east Europe, in 1882.

With some of the varieties of central and east Russia our progress has been slow, as the scions had not been packed properly for so long a journey. Yet we now have specimen plants of most of the varieties specially attracting our attention as likely to prove valuable for culinary or dessert uses, and we have sent out for trial many plants of the most promising sorts.

Our soil is not favorable for the pear; hence we used our first-planted trees in a rough way, by taking off all the new wood each year for scions. This treatment, combined with the severe weather of the last two winters, has given us correct notions as to the relative hardiness of varieties.

The following is a list of the varieties of pears imported by Professor Budd, with the names, as reported to the American Pomological So-

* It should be clearly understood that this is the merest conjecture, and that they are almost worthless in quality when grown north of about 38°.—H. E. VAN DEMAN.

ciety by Mr. Charles Gibb, of Abbotsford, province of Quebec, Canada, at the society's meeting at Boston, in September 1887. These names are arranged alphabetically, and accompanied by the Russian or German names, to insure ready identification. Until they shall have been printed and compared, there is of course a liability, as already stated, that some of them may prove to be duplicates :

Adopted name.	Russian name.	Adopted name.	Russian name.
Autumn Bergamot.	Bergamot Osennui.	Lemon.	Limonnaya.
Baba.	Gruscha Baba.	Long Green (introduced long since).	Longue Verte.
Banvier d'Automne.	Banvier d'Automne.	Long Stem.	Dolgokvostka Morosovskaya.
Bear.	Dula Medvedevka.		Lutovka.
Csar.	Taarakaya.		Ogonka.
Double Beurré.	Maalitchnaya Dvolnaya.		Pasovka.
Dula.	Dula.		Polish Lemon.
Early Duchesse.	Duchesse Précoce.		Poltava.
Early Bergamot.	Bergamot Rannaya.		Pomerania.
Father's Keepsake.	Olcovka.		Pound (introduced long since).
Feigen.	Feigenbirne.		Princess.
Flat Bergamot.	Bergamot Ploskul.		Red Bergamot.
Gakovak.	Gakovskaya.		Saccharine.
Goubalt (introduced long since).	Goubalt.		Salzburg.
Green Bergamot.	Bergamot Zelenui.		Sapieganka.
Green Wine.	Grüne Weinbirne.		Scented.
Grella.	Grella.		Seedless.
Grumkower.	Grumkower.		Strawberry.
Gute Grüne.	Gute Grüne.		Sugar.
Honey.	Gliva Medovaya (Honeybirne).		Victorina.
Juley Gliva.	Gliva Otchen Sotch-naya.		Vinograd.
Janfer.	Janferbirne.		Veduti Bergamot.
Korsun's Bergamot.	Korsun's Bergamot.		Waxen.
Kostotchka.	Kostotchka.		White Livland.
Krupyanka.	Krupyanka.		Winter.
Kurak.	Gliva Kurskaya.		
Kurak Bergamot.	Bergamot Kuraki.		
Large Sugar.	Zuckerbirne, Grosse.		

At the annual meeting of the Iowa Horticultural Society in January, 1887, Hon. C. L. Watrous, reporting for the vicinity of Des Moines, Iowa, says:

Of pears there are not enough trees to count. Young trees of Seedless seem healthy and free from blight. Whether they will bear fruit, or what may be its quality, we know not, but live in hopes.

Andrew Peterson, of Carver County, southern Minnesota, during the summer of 1886, had several varieties of Russian pears and apples from his native country, Sweden; but, judging from appearances, he deemed those from Russia the most promising for Minnesota. In January, 1887, he reported the Russian pear trees as showing no injury up to that date; while of sixty varieties imported from Sweden one only is sufficiently hardy for Minnesota.

Professor Porter, of the Minnesota Agricultural College, reports a few Russian pears as on trial at that institution, near Minneapolis, where they give promise of much value.

The seedless pear (*Bessemianka*) is also reported to be on trial at Ramsey, McCook County, Dakota.

A few pear trees grown from seeds brought from Russia by the Mennonites, are said to be growing in southwestern Minnesota.

Professor Budd, in January, 1887, said :

I believed six years ago, and am stronger in the belief now, that east Europe has many sorts of pear, cherry, and plum which would give perfect satisfaction in the north half of Iowa, and some in Minnesota and the north half of Dakota.

It is feared by many that the transplacing of Russian fruits to the much lower latitude of Iowa may greatly affect their season of maturity, and that it may even injuriously affect their quality and, by possibility, their hardiness; but the season of ripening may be deemed less important with this fruit than with the apple. These influences will therefore be more fully considered in connection with that fruit.

In advance of a thorough trial, Professor Budd expresses the conviction that a very considerable number of the varieties mentioned in the foregoing list will prove hardy as far north as central Iowa, while a few of them, among which he names Seedless, Gakovsk, and others are considered to be adapted to a wider, though yet indefinite, range northward. Careful and extended experiment, such as he is understood to have already in progress, can only surely determine the correctness of these suppositions. Meantime he suggests a resort to the artificial crossing of the best and hardiest of the older and well-known varieties upon the most promising of these foreigners, with the hope of improvement possibly in both quality and hardiness.

Speaking with reference to southwestern Iowa, he remarks :

With regard to Chinese pears, those who have condemned them get their trees from New Jersey or about Philadelphia. From such experience we are all inclined to condemn Chinese pears. On the college grounds they came through all right. I do not mean the Sand pear, but the Snow pear. Some of them I can recommend for this part of the State.

We have Snow pear trees from northwest of Pekin. Eugene Simons sent fifteen varieties of Snow pears from China to Metz, France. I was there when these were bearing and the pears ripe. Some of them are hardy enough for this part of Iowa; and I do not know how much farther north they will endure the climate.

The professor, on another occasion, says :

"Our pear, coming from southern Europe, is subject to blight here, but not there; which shows that they are not adapted to our country. We can start from seedlings and work up our pears. But even this is not necessary. We have a sadly-misused pear tree on the college farm, that made during the past year, from 3 to 5 feet of growth, which is entirely hardy and an abundant bearer. This pear has stood everywhere, without any blight, in northern Dakota, near the Rocky Mountains and all over the Northwest. We also have other pears which are hardy and fruitful.

In the *Prairie Farmer* of September 17, 1887, the professor says :

On general principles, I can say that Bezi de la Motte, St. Ghislain, and Flemish Beauty will be likely to do as well as any of the old sorts. Of the newer pears from Russia, the Seedless and Gakovsk are as promising as any for home use or market.

It is understood that the last two varieties have not yet fruited in this country. If so, it must be inferred that the foregoing conclusion, involving their productiveness and the quality of the fruit, as well as

the vigor and hardiness of the trees, is based mainly upon his knowledge of their performances in their original locality. Except upon a statement of the reasons for such conclusion, in such case it must be assumed to be rather suppositional than conclusive.

A society report from southwestern Iowa, made in 1886, says the pear crop there is a failure, most of the trees being nearly dead.

Mr. Denlinger, of Dubuque County, is reported as having on trial the Arctic pear, a Russian variety, which in 1885 made a growth of 3 feet. He also had the Keiffer on trial.

In 1886 the Dubuque Society recommended the Longworth pear (a variety very little known) as worthy of trial, also the Seedless and Gakovsk, two of Professor Budd's importations from Russia.

Circumstances would indicate that these recommendations were probably made rather on account of the apparent hardiness of the trees than from a definite knowledge of the quality of the fruit as produced in this country.

An additional indication of the uncertainty of the more common varieties of this fruit even in eastern Iowa occurs in a paper by John Evens, read before the Union Horticultural Society in 1886, as follows:

I have planted many pear trees, mostly standards, but have not fruited very many. Could get them to grow well for a few years, or until they were old enough to bear, and then the blight would take them. I have had the best success with Bartlett, Flemish Beauty, Sheldon, Tyson, Buffum, Seckel, White Doyenne, Angouleme, and Lawrence.

Secretary Hammond, of the Illinois State Horticultural Society, names Flemish Beauty, Anjou, and Tyson as having proved hardy in the northern portion of that State.

Dr. T. H. Hoskins, of northern Vermont, in the American Garden for September, 1887, says of the new Russian pears:

Whatever may be the individual or class merit of these pears as dessert fruit (and we are not likely to find many, if any, equal to the best of our old varieties among them), they are yet remarkably interesting as a class, not only for their superior hardiness against cold and drought, but also from the fact that they introduce a distinctly new strain of blood, so to speak, and one which, by crossing upon those we already have, is likely to give us some superior varieties. The firm glossy foliage, not so thick and firm as that of the Chinese, but yet tending that way, indicates a strong resistant power, not only against heat and dryness, but also against insects and fungi. In the many years I have been trying in vain to discover one pear which I could grow successfully in northeastern Vermont, one of the most discouraging things I have noted about all of them (except Keiffer and Le Conte) has been the defective character of the leafage. Indeed I think that if it were not for this insurmountable difficulty we already have pears hardy enough to grow much farther north than they are with success. Without healthy leaves there can not be thoroughly matured wood; and it is the weakness consequent upon this which I think has prevented my success with such "almost hardy" pears as Onondaga, Clapp's Favorite, Jackson, Flemish Beauty, and Grand Isle. They endure, as it is, all but our severest winters, and therefore it seems to me that if we could give them a better leaf we could grow them successfully. Now it happens that some of the Russian pears reported to be best in quality are also the hardest and have the best foliage. A cross of Seedless, Sapieganka, Dula, Toukovietka, or Pasovka upon our hardest sorts named above might confer

upon the seedlings that better leaf which is so greatly needed. I trust that some enthusiastic pear-growers may be sufficiently interested in the matter to be willing to make these crosses and grow the resulting seedlings to fruitage. This can only be done by those so situated as to be able to grow and fruit both kinds, which we of the "cold North" are unable to do.

This last conclusion is but partially true, since even at the "cold North" these new iron-clads may be grown to fruitage and the bloom fertilized with pollen from milder climes.*

How far north the pear may be successfully grown in America is a problem the solution of which can only be fully accomplished in the remote future. Although there is a popular notion that a plant may be gradually brought to endure a climate more exacting than that to which it was originally adapted, experience has long since shown that the capacity for such variation, so far as varieties are concerned, lies within very narrow limits. The process through which important results of this character are to be accomplished must rather be the more tardy one of reproduction and selection, either artificial or natural, through which all the wide adaptations of both animal and vegetable life have been wrought.

By the light of science, aided by intelligent manipulation, the otherwise tardy process of natural selection—the survival of the fittest—may, beyond a question, be greatly hastened. Doubtless, mainly through natural processes, these Russian fruits have been brought to an adaptation to that climate not originally inherent in the species; and their introduction to the trying climate of our central prairie region thus affords to us a vantage-ground—an advanced starting-point—from which results desirable to us may perchance be sooner reached, since it may be fairly assumed that their surroundings here of climate and soil can not be completely identical with those whence they were taken; and, if so, that new characteristics, only to be acquired through reproduction and selection, are likely to be found needful for their proper adaptation to the new surroundings.

Viewed even in this light, the labors of Messrs. Budd and Gibb must be deemed to be of great value to the pomology of the North, since even should these introductions fail to realize the sanguine hopes of the introducers, they will surely afford the foundation, otherwise wanting, upon which the more certainly and rapidly to build a satisfactory superstructure in a nearer future.

THE APPLE.

The Apple of Europe and America (*Pyrus malus*) was introduced in North America from Europe by the early settlers. It is believed to have sprung from the wild crab of Europe, and was extensively culti-

* The writer by this evidently means to refer to the fact that pollen may be sent by mail or otherwise from regions of a milder climate, where the better, but tenderer, pears will succeed. It may not be generally known that pollen of many kinds may be kept for months and even years and retain its vital powers.—H. E. VAN DEMAN.

vated by the Romans, who are supposed to have introduced it into England; whence it was brought to this country. The Siberian crab (*Pyrus baccata*), in various improved forms, is more or less common in this country, especially in regions in which superior hardness is requisite. A kindred species, known botanically as *Pyrus prunifolia*, is also a native of Siberia. China also has an allied species, known as *Pyrus spectabilis*.

Our wild and uneatable native crab (*Pyrus coronaria*) is common in the northern United States, and a species known as *Pyrus rivularis* occurs west of the Rocky Mountains. The dwarf, or Paradise apple, used mainly as a stock for dwarfing the apple, is considered to be a variety of the common apple.

(1) In treating the subject with more especial reference to the apple it appears more convenient to consider the region in question as divided into districts. In so doing it seems proper to commence at the east, designating northern New York, Vermont, New Hampshire, and Maine as the Northeastern District.

While the Champlain Valley is found to be more congenial to fruit culture than most other regions in that latitude and vicinity, the favored location is of but limited extent. Throughout northern New York, Vermont, and New Hampshire generally the climate is quite too severe for the great mass of popular apples. Fameuse here being one of the most satisfactory of such, although even this is by no means exempt from occasional injury in winter, while its tendency to scab and crack is a serious drawback upon its usefulness. There is in this northern region an apparent improvement in the texture and glossiness of its foliage, which may be supposed to the more perfectly adapt it to a dry climate, as well as to increase its ability to fully mature its wood in preparation for the occasionally-exceptional severity of winter. Even with such preparation, however, it occasionally fails to withstand the trials of a crucial winter, and for these reasons there is here as elsewhere an anxious casting about for a hoped-for substitute.

Several recent varieties have been tested by Dr. T. H. Hoskins, of Newport, Vermont, and others, among which Scott's Winter, at present, is thought to be the most promising, at least for the region in question.

The importations by the Agricultural Department at Washington, and the more recent ones by the Agricultural College of Iowa, have been watched with great interest here, and many of the varieties have been or are being tested. Mr. Charles Gibb, of Abbotsford, Quebec, was the associate of Professor Budd in his expedition to central and eastern Europe for the purpose of studying varieties and climates, and it is understood that he has since made a second visit to that region upon the same business.

For the purpose of, as far as practicable, adapting the, to us, unpronounceable pomological nomenclature of Russia to the needs of English-speaking people, the American Pomological Society, at its meeting

at Grand Rapids, Michigan, in 1885, constituted Mr. Gibb a committee of one to revise and, when needful, to Anglicize the names of these introduced varieties; an onerous and perplexing task, which he has now completed; his final report having been made at the recent meeting of that society at Boston.

The pomology of the sea-board portion of the State of Maine is so affected by oceanic influences that it does not differ very widely from that of southern New England. The more northern interior is yet a new and comparatively unimproved region, in which fruit culture is yet in a comparatively crude state. It is understood, upon the authority of Dr. Hoskins, that there exists there an extensive tract of lake country well adapted to the cultivation of the apple—it being moderately elevated, with convenient access by river navigation to the sea-board. Its pomology, when developed, may be expected to assimilate somewhat closely with that of the adjacent inland province of Quebec, which does not differ very widely from that of the extreme northern portions of western New England.

(2) The district of the Great Lakes includes central and western New York, and thence westward to and including the lower peninsula of Michigan.

So varied are the local influences of the Great Lakes westward of eastern New York and thence to Wisconsin and Minnesota, modified as such influences are by the direction of prevailing winds, that a climatic division of this region upon parallels of latitude become impracticable.

In central and western New York, and equally in the lower peninsula of Michigan, these influences are so far equivalent to the oceanic influences which modify the climate of southern and eastern New England, that their pomology is practically identical, and may therefore be considered as mainly without the scope of the subject under consideration.

(3) The Wisconsin lake district includes a comparatively limited region in Wisconsin, lying along the western shore of Lake Michigan, which derives a very perceptible climatic advantage from such proximity, which would doubtless be fully the equivalent of that realized upon the eastern shore, but for the fact that the prevailing winds of that region are westerly, bringing an increased tendency to drought and to paroxysms of cold in winter which reach the region without the mellowing influences of the open waters of Lake Michigan; thus creating a climate intermediate between that of the Upper Mississippi Valley and that of the lake region proper.

•(4) The Lake Superior district, including the upper peninsula of Michigan, together with a strip of northern Wisconsin along the south shore of Lake Superior. Although extending northward beyond the parallel of 47°, this district is yet so favorably affected in climate by the surrounding lakes, that it escapes some of the severity of the climate of regions upon that parallel farther west.

Although fruit culture has so far received but slight attention there, the experience already had indicates, as may have been inferred from its lacustrine surroundings and the direction of prevailing winds, especially in winter, that the climate becomes less desirable for such purpose as we proceed westward until we pass beyond the lake influence, and come within the typical climate of the western plains.

C. D. Lawton, of Lawton, Mich., who has spent much time in the upper peninsula of Michigan, states that fair apples are grown there, and that there are many fine trees which sometimes bear well. There is abundance of plums, when frosts do not catch the bloom in spring. They are mostly wild red plums, although the cultivated varieties seem equally successful where tried.

Pears do pretty well also; at least he has seen trees loaded with excellent fruit, which matured nicely.

He never elsewhere saw Early Richmond cherry trees more heavily loaded with fruit than there, wherever they have been planted. The branches needed to be propped up to prevent breaking under the loads of fruit. Currants, gooseberries, raspberries, blackberries, and strawberries abound.

Although this is a cold country, it has much good soil well adapted to root crops, as well as to many of the hardy fruits, which will doubtless be successfully grown as soon as agriculture shall become a staple industry.

At the Chippewa County fair in 1880 a fine display of apples was made, grown from trees of hardy varieties obtained from a Minnesota nursery.

In Delta County the last State census reports a ten-acre orchard of bearing peach trees.

Marinette, the half-breed granddaughter of an Indian chief, is said to have planted the first apple orchard in Menominee County, which is still in bearing.

C. D. Lawton has seen, at L'Anse, Baraga County, fine apples of Fameuse, and some of Russian and other hardy varieties, as well as an abundance of other hardy fruits.

Trees from the head of Lake Superior, including Oldenburg, Wealthy, Siberian crab, and others were planted in this county in 1862, which are yet doing well and producing fair crops of fruit.

Mr. Lawton also reports hardy apples and other fruits successful in Ontonagon County.

The State census of 1884 reports 94 acres of apple-orcharding in the upper peninsula.

Owing doubtless to the influence of the surrounding waters the orchards of the peninsula are exempt from blight, or at least so nearly so that the malady attracts no attention.

(5) Since westward of the districts heretofore described there are few if any local influences which essentially modify the climate, the south-

ern prairie district will consist of northern Illinois, the south two-thirds of Iowa, all of Nebraska, and the south half of Wyoming.

(6) The intermediate prairie district will include the south half of Wisconsin (westward of the lake district), the north one-third of Iowa, the south one-third of Minnesota and Dakota, with the north half of Wyoming.

(7) The northern prairie district includes northern Wisconsin (omitting the Lake Superior region), the north two-thirds of Minnesota and Dakota, and all of Montana.

BLIGHT AND LACK OF ABILITY TO WITHSTAND THE HOT DRY AIR OF THE SUMMERS
OF THE WEST AND NORTH.

In the earlier days of apple culture in the northern United States what is now known as blight seems to have been unknown, or if known, to have been confined to the pear. Even at the present day apple-tree blight, where known at all from Michigan eastward, has not proved specially troublesome. Only farther west, under greater extremes of heat, cold, and aridity, has the malady proved serious and even fatal.

A singular, and to some at least an unexpected, circumstance is, that it becomes even more virulent and fatal as we go northward. Practically unknown in Europe, it in many cases proves fatal to varieties introduced from that country in our interior American climate.

Apparently akin to the blight so often fatal to the pear, like that insidious malady, it has so far eluded the discovery of either the cause or cure; although the comparative exemption of the East and the lake region of the West, including the cold but moist region of upper Michigan, together with the observed fact its outward manifestation usually occurs during the heat of the day, strongly indicate that both heat and aridity may be essential to its effective existence. It may also be reasonably inferred that a lack of hardiness in winter may not infrequently be due to the lack of maturity consequent upon loss of foliage from blight in summer.

HARDINESS IN WINTER.

Just what peculiarities of composition and structure go to constitute the quality of wood-growth, known as hardiness, seems yet to be an unsolved problem. It is nevertheless quite well understood that in the case of the apple-tree, now under consideration, it becomes necessary that the season's growth shall have been thoroughly perfected; that the maturing processes shall have been completed, and that the whole be done well in advance of winter; in other words, that a hardy tree must be one whose growth is quite sure to be thoroughly ripened well within the proper season.

Aiming to secure results of this character for his State, as well as for the North generally, Peter M. Gideon, of Excelsior, Minn., some twenty-three years since commenced the process of reproduction and

selection, using the Siberian crab as the basis of his operations. The following is extracted from his report to the Minnesota State Horticultural Society in January, 1887, as superintendent of the State Experimental Fruit Farm, which, although perhaps over-enthusiastic, yet gives a correct idea of the processes employed:

It is with pleasure that I comply with your request to give my views on Russian and seedling apples. The seedling has been my hobby for the last sixteen years, and the success attained gives me hope that not far in the future the cold Northwest will be one of the leading apple growing districts of North America.

Twenty-three years ago I planted a few cherry-crab seeds, obtained of Albert Emerson, Bangor, Me., and from those seeds I grew the Wealthy apple; in seven years it fruited, and that fruit convinced me that the true road to success was in crossing the Siberian crab with the common apple, and on that line I have operated ever since, with results surpassing my most sanguine expectations. I did not suppose that in the short space of sixteen years, the time since the Wealthy first fruited, that I should have more than twenty first-class apples, as good as the world can produce, in succession from the 1st of August to March, and in hardiness of tree surpassing all known varieties of the common large apple. But it is done, and in the doing, the problem is solved as to what to do and how to do it, with the material at hand with which to attain yet greater results. At the outset it was test and try; but now that the problem is solved, it is onward, with great results certain.

When I say we have twenty first-class apples, that does not include all that are worthy of cultivation by any means. And now, with such results and only a few thousand trees fruited at the end of sixteen years, what may we not expect at the end of the next sixteen years with 20,000 or 30,000 choice selected trees from the very best of seed which are not yet fruited, and the seed of over 100 bushels of choice apples planted this fall, all to fruit in a few years. Then on planting the seed of the best each year, soon the choice varieties will count into the hundreds, and the great Northwest will be the fruit paradise of America.

To get the desired cross we plant the selected varieties in close proximity, so that the natural flow of pollen will the more surely do the desired fertilizing, and the seed thus produced is planted, the most promising of the seedlings selected and set in orchards for fruiting, and after fruiting the best in tree and fruit is selected from which to grow seeds to try again, and so on; at each repetition I find there is a gain. The young trees that fruited this year for the first gave a larger percentage of first-class than any lot ever fruited before.

By crossing and judicious selection we retain the hardiness of the crab in the tree without the crab thorns, and on top grow large apples without the astringency of the parent crab. And yet by the commingling of the two natures we get an exquisite flavor not found in any other class of apples, especially so when made into sauce. But our triumph is not yet completed. We must—we can, fill up the balance of the year with a continued succession of luscious apples. There is no question as to the certainty of such a result. The past is a guaranty that it can be done.

But the proper cross can not be got in Minnesota—a fact clearly demonstrated in the extensive and expensive trials that have been made in the last nine years in the State orchard. And here let me state that the seedling is inclined to ripen its fruit at or near the time the parent apple did from which the seed was taken; hence the need of seed from long keepers to grow the same. There are no long keepers of the best quality yet found that are hardy enough to fruit in Minnesota; but we can take our best hardy seedling farther South, where the long keepers can be grown and there get the cross, and then bring our seed here to grow, and test the hardiness of the tree and the quality of fruit. We want first-class apples, and to get them we must use first-class parentage, and even then seedlings will be numerous, from the fact that all varieties of apples are mongrels of many degrees of crossing, and the various relations

will crop out in a multitude of forms. But past success is a guaranty for the future, that out of the many some will be good. Our seedlings will average in quality with Hyslop and Transcendent; but those of first-class, such as we propagate, stand about one to five hundred, as hardy as Duchess and Wealthy, and of the extreme hardiest about one to fifteen hundred.

Seedling trees for distribution.—Two years ago this winter was the first time the Duchess and Wealthy were seriously hurt, and a like fate befell all the Russians on our grounds, so that not a Russian set an apple on our grounds the next year, whilst alongside of them our seedlings carried a fair crop, some of them profuse, and this year all bore heavy crops; showing beyond a question that the crab infusion is to be the foundation of successful fruit culture in the Northwest. The State orchard yielded about 100 bushels of apples this year, all of which being off our own seedlings; all else of value failed two years ago this winter. This fall we planted the seed of over 100 bushels of choice apples, to grow for experimental purposes. We now have thousands of choice trees on hand for distribution to those who want one, two, three, and four year old trees from seed.

Among the numerous varieties thus originated by Mr. Gideon he names Lou, August, Florence, Cherry-Red, Excelsior, September, Martha, October, Wealthy, Gideon, Peter, and January as especially desirable, and as supplying a succession from the 1st of August to March.

Feeling the importance of being able at the earliest possible moment to supply an ample assortment of varieties adapted to the climate, not only are prominent fruit-growers watching carefully such local seedlings as come to their knowledge, but horticultural societies also are aiding the work by the appointing of committees and in various other ways.

Such recent varieties appear in the following tabulated list, accompanied in the proper column by a dagger (†) indicating that they have been reported worthy of trial in the district to which such column is devoted.

Aside from the foregoing, the tabulation comprises only the older varieties of American origin found to be more or less successful in some portion of the region under consideration. In the second district, however, where even the more tender varieties prove successful, note is only made of varieties which, while successful in other and more trying regions, are at the same time popular here, and is marked by an asterisk (*). This sign in every case signifies that the variety so marked is reported as successful in the district indicated.

Throughout the tabulation an interrogation accompanying an asterisk (*†) is intended to indicate that while the variety is more or less desirable in the district, either from blight in summer or from deficient hardiness in winter, it is liable to more or less serious objection.

Varieties.	Northeastern district: northern New York and northern New England.	District of Great Lakes: central and western New York, northern Ohio, and lower Michigan.	Wisconsin lake district: west shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wisconsin.	Southern prairie district: northern Illinois, southern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie district: southern half Wisconsin (west of lake district), northern third of Iowa, southern third of Minnesota, and Dakota, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two-thirds Minnesota and Dakota, all Montana.
American Golden Russett			()		()		
American Summer			()		()		
August							
Beech's Sweet							
Ben Davis	()	()	()		()	()	()
Bonomi							
Bethel (Vermont)	()						
Black Annette					()		
Boone							
Brett No. 1							
Brett No. 2						()	
Brett No. 3						()	
Briar's Sweet						()	
Buckingham							
Canada Baldwin	()				()		
Cherry Red						()	()
Cole's Quince		()	()	()	()		
Dart							
Dominio		()	()		()	()	
Duchess Seedling							
Dyer		()			()	()	
Early Harvest		()		()	()		
Early Pennock					()		
Early Strawberry Crab				()	()	()	()
Elgin							
Fall Orange							
Fall Queen (Haas)	()	()	()	()	()	()	
Fameuse	()	()	()	()	()	()	
Fameuse Snori	()						
Flat Apple					()		
Florence						()	()
Flory							
Gibb	()		()	()	()	()	()
Gideon							
Gilpin (Little Romanite)		()				()	()
Golden Russett (New York)	()		()	()	()		
Golden Sweet		()					
Gravenstein		()					
Grimes' Golden		()	()		()	()	
Hall's Greening						()	
Hotchkiss						()	
Hawthornden		()	()	()	()	()	
Hightop Sweet (Sweet June)		()			()		
Hyslop		()	()	()	()		
Iowa Russett	()		()	()	()	()	()
Jeffries		()			()		
Jonathan		()	()	()	()		
Kaump					()	()	
Klein							
Late Strawberry		()	()		()		
Lou						()	()
Lowell		()	()	()	()		
MacIntosh Red	()						
McMahon's White	()						
Maiden's Blush		()	()		()	()	
Maiden's Blush Crab							
Mann		()			()	()	
Martha					()		
Milam					()	()	
Minnesota					()	()	
Newport					()		()
Northern Spy					()		
Northwestern Greening						()	
October							()
Okobena						()	
Orange Crab							()
Orange Winter							

Varieties.	Northeastern district: northern New York and northern New England.	District of Great Lakes: central and western New York, northern Ohio, and lower Michigan.	Wisconsin lake district: west shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wisconsin.	Southern prairie district: northern Illinois, southern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie district: southern half Wisconsin (west of lake district), northern third of Iowa, southern third of Minnesota and Dakota, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two-thirds Minnesota and Dakota, all Montana.
Peach (Montreal)	(*)						
Peerless						(b)	
Perry Russett		(c)	(cc)		(cc)	(b)	
Pewaukee	(c)		(cc)				
Plum's Cider	(c)		(cc)		(cc)		
Porter		(c)	(cc)		(cc)		
Pound Royal		(c)			(cc)		
Powers' Crab						(c)	(c)
Primate					(c)		
Quaker Beauty							(c)
Quince of Coxé					(cc)		
Ramsdell's Sweet					(cc)		
Rawle's Janet					(cc)		
Red Canada					(cc)		
Rollins						(c)	
Roman Stem					(cc)		
Rome Beauty		(c)			(cc)		
St. Lawrence	(*)	(c)		(b)	(cc)		
Salome					(cc)		
Sarnia Crab						(c)	
Saxton (Fall Stripe)					(c)		
Scott's Winter	(*)					(c)	(c)
Seever					(c)		
September						(c)	(c)
Sheriff					(c)		
Solero						(b)	
Sops of Wine					(c)		
Shlawassee	(*)	(cc)					
Summer Hagloe		(cc)			(c)		
Sweet Russett						(cc)	
Talman Sweet		(c)	(c)		(c)	(cc)	
Telfer Sweet Crab						(cc)	
Transcendent		(c)		(c)		(cc)	(c)
Utter's Red						(cc)	
Virginia Crab						(cc)	(c)
Wabasha						(cc)	
Walbridge	(c)				(cc)		
Wealthy	(c)		(c)	(c)		(c)	(c)
Wealthy Seedling					(cc)		
Westfield Seek-no-Further		(cc)	(cc)		(cc)		
Whitney's No. 20	(*)	(cc)	(cc)		(cc)	(c)	(c)
Williams' Favorite		(cc)	(cc)		(cc)		
Willow		(cc)	(cc)		(cc)		
Winesap					(cc)		
Winstead						(b)	
Winter St. Lawrence	(*)						
Wolf River			(c)		(cc)		
Yellow Bellflower					(cc)		
Yellow Ingeatree					(cc)		

An examination of the foregoing table will develop the fact, that even the limited success of eastern varieties of the apple, when grown westward of the Great Lakes, is mainly confined to the southern portion of the region under consideration; and it may be further stated that a more critical examination, aside from the table, will determine that even this measure of success is to be attributed to the more favorable conditions occurring in southern Nebraska and in the extreme southern part of Iowa.

Another noticeable circumstance is, that as we progress northward, planters are compelled to rely more and more upon varieties partially or wholly of Siberian-crab parentage, until, in the more northern portions of Wisconsin and Minnesota, and doubtless even more so in northern Dakota and Montana, the successful varieties are almost wholly of this species.

At the annual meeting of the Minnesota State Horticultural Society, in January, 1887, a black-list, consisting of semi-hardy varieties "that it may be considered especially dangerous to recommend for planting in large quantities," was adopted, as follows: Mann, Bethel, Walbridge, Fall Queen (Haas), Pewaukee, Alexander, Borsdorf, Northern Spy, Salome, Utter's Red, Fameuse, Wolf River.

At present many are probably looking earnestly to the newly-imported Russian apples to supply the deficiency; *but whatever shall be the measure of their success, actual trial alone can demonstrate their ability to meet and supply so extreme a want.*

The Iowa Agricultural College, from the outset, seems to have made an earnest effort for the development of the horticulture, and especially the pomology of the State. An early step in this direction was the planting of an extensive orchard, comprising the varieties at the time considered hardy in the State. The increased severity of subsequent winters began to tell upon it, and when it began to show serious signs of failure, another plantation was made of iron-clads, to be top-grafted with such varieties as were reputed to be specially hardy. Among these were a considerable number of local seedlings, which had acquired special reputation for hardiness. These were interspersed with some selected Russian varieties, thus affording a comparative trial of the two. In the summer and fall of 1887 many of these last were bearing fine crops, while, as stated by Professor Budd, the recent exceptional winters had almost wholly swept away the supposed hardy natives interspersed among them, while the remains of the older orchard were being dug out and burned.

Doubtless, under the influence of discouragements akin to those already described, Mr. A. G. Tuttle, of Baraboo, Wis., imported scions of Russian apples probably as early as 1866 or 1867, which he proceeded to propagate, test, and disseminate. To these he subsequently added varieties from other and later importations, so that he now has a very considerable orchard exclusively of Russian varieties in full bearing.

A visit to this orchard in August last found several of the earliest varieties already past season, while others were ripe or rapidly approaching maturity, affording apparent ground for the claim that, owing to change of latitude, or other cause, there is among them a deficiency of long keepers. However this may be, the trees which had withstood the trials of the recent severe winters were almost universally sound and healthy, excepting that a very considerable number of them gave evidence of the effect of blight upon the younger branches during the past summer.

The healthy condition of this orchard (and the same is true of at least another in the vicinity) was in strong contrast with that of other trees upon the same premises, except of such of our native varieties as have usually been considered very hardy, such as Fameuse, Willow, Ben Davis, Grimes's Golden, and others, many of which showed serious, if not even fatal, injury, doubtless the effect of the trying winters already referred to.

The U. S. Department of Agriculture also, in 1870, made an importation of scions from Russia, of which a list of numbered varieties is published, and the scions widely distributed for trial. The Russian names were so difficult of pronunciation, that even yet they are very commonly referred to by numbers.

An early test of a very considerable number of these, including perhaps some of their own importations, was made by Ellwanger & Barry, of Rochester, N. Y., by the planting and fruiting them in their trial grounds.

An examination of these in fruit, in company with W. C. Barry, early in September, 1883, showed nearly all these even then, fully ripe or already overripe; and the quality, without exception, proved to be so low, that the general conviction was that their chief value must be supposed to consist in their ability to transmit their probable hardiness to a progeny of new originations of higher quality.

In 1878 or 1879 the authorities of the Iowa State Agricultural College deputed Prof. J. L. Budd to arrange for the importation of trees, plants, and scions from localities in central and eastern Europe in which, from similarity of soil, climate, etc., he might hope to obtain varieties adapted to the conditions occurring in Iowa and other portions of the Northwest.

In pursuance of this purpose, the professor, in company with Mr. Charles Gibb, of Abbotsford, Quebec, made a lengthened visit to central and eastern Europe, extending their trip as far as the valley of the Upper Volga, where, in most essential particulars, the climate is nearly akin to that of the valleys of the Upper Mississippi and Missouri. As the result of such visit and examinations, besides other fruits, shrubbery, forest, and ornamental trees, no less than nineteen importations of apples were made between May, 1879, and January, 1885, from various localities in Russia, Poland, Germany, and Austria.

These, together with those secured from the importations of others, have been extensively propagated at the college, and the product widely disseminated at a nominal charge for trial throughout the Northwest, so far as their success seemed probable, but under an arrangement providing for careful reports of results.

Complaint is made by President C. G. Patten, of the Iowa State Horticultural Society, and by others, as well, that some of the Russian apples are slow growers—a peculiarity which may with some of them prove to be constitutional, having, as they had, their origin at the extreme north, where, doubtless owing to the shortness of the growing

season, together with the unusually arid climate, the tree under continued propagation from seed assumed a permanently dwarfish condition, not likely to become changed by the transmission of the variety to a different climate—a fact likely to prove equally true so far as hardiness also is concerned; although it must be conceded that in this particular there may be at least apparent exceptions, since at Des Moines, on the grounds of Hon. C. L. Watrous, were found a considerable number of what are considered to be among the hardiest and most desirable of the Russian apples; trees of which, four or five years planted, when cut through, were found to be more or less black-hearted, and many of them quite past the possibility of successful growth and permanent usefulness. Similar cases of obvious winter-killing in the case of older bearing trees of Russian apples were also seen upon the grounds of A. W. Sias, of Rochester, Minn., as well as in another extensive orchard in that vicinity, and also upon the grounds of President Patten.

A change of latitude, accompanied, as it must necessarily be, by a change of climate, and especially in going southward, by lengthening of the growing season, must necessarily change the season of ripening, at least in the case of a winter fruit. This is a well known result of such migration of our native fruits, which must prove equally true of these importations, although the extent of such variation can only be surmised in advance of actual trial.

There is also in America, and doubtless likewise in Europe, an unmistakable modification of the character of fruits, doubtless due to modified climate, when transferred inland, even without change of latitude; but just how much of such change may be due to greater aridity, higher or lower average temperature, more violent extremes, deficient moisture in the soil, or to variations of soils, is a problem too complex for satisfactory solution under these varying circumstances; while a change in the season of maturity and possibly the variation of the quality of fruit may be anticipated, and the probable direction of such variation foreseen, its amount, whether in season or quality, can only be determined by actual trial.

While, therefore, there are in many minds grave doubts as to the soundness of the opinions put forth by Professor Budd and others respecting the sufficiency of the Russian apples to meet and supply the present lack, such doubts seem mainly to turn upon the question *whether, under so extended a transplanting, they are likely to sufficiently retain their original long-keeping qualities.* In this connection it is perhaps due to the professor to state that, while he does not deny the objectionable modification of the earlier importations of Russian apples as to the season of ripening, he urges that these were west Russian or sea-board varieties; and that the varieties from the interior, where the climate is more nearly that of the prairie regions, have been but recently imported, and that they yet lack time to show results. He insists that among these there is good reason to anticipate a sufficient supply of long keepers.

Since these experiments are being conducted at the South (latitude 42°), the object of pre-maturity may be expected to become less and less as we go northward, where the chief question becomes that of sufficient hardiness.

The blight of the apple-tree, if not wholly unknown in New England and New York, is at least so little known as scarcely to excite remark; while in Michigan it rarely attacks a tree below the growth of the current year, and not even that to such extent as to effect serious injury. As we go westward the malady becomes increasingly troublesome beyond Lake Michigan, increasing in virulence westward, and especially northward. At 20 miles from the lake, in Wisconsin, it occasions more or less injury; while at Baraboo, midway across the State, it becomes increasingly troublesome, occasional trees being nearly or quite ruined by it. In northern Iowa and southern Minnesota it is quite as prevalent and injurious. Still farther north, at Excelsior, Peter M. Gideon finds it very troublesome upon crab seedlings, while his orchard of Russian apples has been utterly ruined by it.

From all the circumstances, it seems highly probable that there may at least be a climatic predisposing cause. If so, there would probably be between the apparently similar climates of central North America and eastern Europe some occult difference which has so far eluded observation, since this malady, so prevalent and destructive in the former, is said to be practically unknown in the latter.

The number of varieties included in these several importations of apples can not be less 350. If, among these, a dozen, or even a half dozen, satisfactory long keepers shall occur, in addition to the earlier ones already tested, the undertaking will doubtless be felt to be amply justified, to say nothing of the means acquired for the origination of a better, because hardier, race of fruit in the future.

In tabulating the following varieties of apples of Russian or east European origin, the names as reported by Charles Gibb, of Abbotsford, Quebec, to the American Pomological Society, are arranged alphabetically, and their success, so far as known, noted by districts, as in the table of native varieties.

The European name is appended in each case, to facilitate reference and insure identity.

In the report of Mr. Gibb there seems to have been cases of uncertainty, which he indicates by an interrogation (?). These are introduced into the following tables along with the names.

In the alphabetical arrangement of the adopted American names, in some cases the same name appears apparently applied to more than one fruit; also in one or more cases the name adopted had been previously applied to an American fruit. In such cases attention is also called to the fact by an interrogation (?).

Although not included in Mr. Gibb's report, Alexander, Oldenburg, and Tetofski, being Russian apples, are introduced into the following list:

Varieties.		Northeastern district: northern New York and central and western New York, northern Ohio, and lower Michi- gan.	Western lake district: Michigan.	Lake Superior district: portion of northern Wis- consin.	Southern prairie district: northern Illinois, south- ern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie dis- trict: southern half of Wisconsin (west of lake district), northern third of Iowa, southern third of Minnesota and Da- kota, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two- thirds of Minnesota and Dakota, all of Montana.
Adopted or translated name.	Russian or German name.						
Acid Repka.....	Rlepka Kislaya.....						
Alabaster.....	Alabastrer Weisses.....						
Alexander.....	Kaiser Alexander.....						
Aport.....	Alfriston.....		(.)		(.)		
Alfriston.....	Saburovskoe.....						
Aloe.....	Yantanoos.....						
Amber.....	Anis.....						
Anis.....	Anisovka.....						
Anisovka.....	Anisimovskoe.....						
Anisim.....	Antonovka.....	(.)	(.)		(.)		(.)
Antonovka.....	Aport.....						
Aport.....	Arabakoe.....	(.)					
Arabka.....	Arabakoe.....						
Arabka (Eilwanger and Barry).....	Arkad.....						
Arkad.....	Tchutlotchnoe.....						
Aromatic.....	Krivospitskoe Aromaticoe.....						
Aromatic Spike.....	Ossennii Aport.....						
Autumn Aport.....	Grushchivka Ossennaya.....						
Autumn Pear.....	Horbat Streifling.....	(.)					(.)
Autumn Streaked.....	Silberpfel von Avenarius.....	(.)					
Avenarius.....	Barloushka.....	(.)					
Barloff.....	Vasilul Veliki.....	(.)					
Basil the Great.....	Batulenopis.....						
Batullen.....	Baumann's Reinecke.....						
Beautifol.....	Arkad Krasnyi.....	(.)					
Beautifol Arcad.....	Svonkoe ili Dinnoe.....						
Beal or Melon.....	Berezinskoe.....						
Bereain.....	Bergadorvskoe.....						
Bergadorf.....	Bergamotnoe.....						
Bergamot.....	Riabnovka.....	(.)					
Berry.....	Biel.....						
Biel.....	Biel gorodskoe.....						
Bielgorod.....	Tchernoe Derevo.....						
Blackwood.....	Kalvil Krausni.....						
Blue Anis (A. G. Tuttle).....							
Bushed Calville.....							

Adopted or translated name.	Varieties.	Northeastern district: northern New York and central and western Ohio, and lower Michi- gan.	Wisconsin lake district: western shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wis- consin.	Southern prairie district: northern Illinois, south- ern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie dis- trict: southern half of Iowa, southern third of Wisconsin (west of lake district), northern third of Minnesota and Ja- kota, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two- thirds of Minnesota and Dakota, all of Montana.
Bode.....	Bodeveskoe.....						
Bogdanoff.....	Bogdanoff (Biepk).....						
Bogdanoff's Glas.....	Steklianka Bogdanova.....						
Bolken.....	Boikenapfel.....						
Bokoroe.....	Bokoroe.....						
Borkoff.....	Borkovskoe.....						
Borovinka.....	Borovinka.....						
Borsdorff.....	Borsdorff.....						
Boeklonoff.....	Boeklonovka.....						
Breakovka.....	Breakovka.....						
Broadbeek.....	Schirokolitichko.....						
Broad Green.....	Nalivnoe zelenui schirokul.....						
Burlovka.....	Burlovka.....						
Buschbohn.....	Buschbohn.....						
Cardinal.....	Kardinal.....						
Champagne.....	Champanskoe.....						
Champagne Pipka.....	Pipka Champanskaya.....						
Charlanoff.....	Charlanovskoe.....						
Christmas.....	Roshdestvenskoe.....						
Cinnamon.....	Koritchevnoe.....						
Cinnamon Anis.....	Anis Koritchevnoe.....						
Cinnamon Pine.....	Koritchevnoe Ananase.....						
Citronat.....	Citronat.....						
Citronen.....	Citronenapfel.....						
Crimesa.....	Crimesa.....						
Crimson Nativ.....	Krimskoe Nalivnoe.....						
Crooked Spike.....	Krivospitoe.....						
Cross.....	Shtirlapfel.....						
Czar's Thorn.....	Tsarskui Sobip.....						
Danilo Pipka.....	Pipka Dantsiskaya.....						
Earliest.....	Skorospelka Rannaya.....						
Early Champagne.....	Champagner Früher.....						
Early Cinnamon.....	Koritchevnoe Rannoe.....						
Early Groundmother.....	Bobushtkino Rannoe.....						
Early Pipka.....	Pipka Liemaya.....						
Early Prolife.....	Yedovitska Rannaya.....						

Early Red.....	Skorspieloe Kraanoe.....					
Early Stripe.....	Polosatska Letnaya.....					
Early Translucent.....	Skvosenena Skorspielaya.....					
Elser.....	Elserapfel.....			(*)		
English Borovinka.....	Borovinka Angliiskaya.....					
English Pippin.....	Englischer Pepping.....					
Enormous.....	Krupnesna.....					(*)
Erdbeer.....	Erdbeerapfel.....					
Flat Mitron.....	Miron Ploekui.....					
Flat Voronezh.....	Voronezhskoe Ploakoe.....					
Fonatic.....	Fonarik Nalivnui.....					
Garden.....	Sadovskoe.....			(*)		
Gedammer.....	Gedammer.....					
General Greig.....	General Greig.....					
German Calville.....	Niematkul Kalvil.....	(*)				
German Ledeneis.....	Ledenetsa Niemetakui.....					
German Prolific.....	Plolovitka Niemetakaya.....					
German Strute.....	Strute Niemetakui (Regel).....					
German's Bean.....	Getmatskul Bob.....	(*)				
Gipsy.....	Tepianka.....					
Glass.....	Steklianka.....					(*)
Glits.....	Glitssovo.....					
Golden Arcad.....	Zolotoi Arkad.....					
Golden Vichette.....	Zolotoi Renet.....					
Golden White.....	Biel Zolotovskaya.....	(*)				
Good Prasint.....	Dobruil Kresdianin.....					
Gorko Pipka.....	Pipka Gorkaya.....					
Grandmother.....	Babuschkino.....					
Great Mogul.....	Vilkuil Mogul.....					
Green Anis.....	Anis Zeleni.....					
Green Astrachan.....	Astrachanskoe Zelenoe.....					
Green Butskaya.....	Butskaya Zelenka.....					
Green Crimean.....	Krimakaya Zelenka.....					
Green Glas.....	Steklianka Zelenka.....					
Green Rubets.....	Rubets Zeleni.....					(*)
Green Stranger.....	Tchujenka Zelenaya.....					
Green Streaked.....	Zelenka Polosataya.....					
Green Transparent.....	Skvosenoi Zeleni.....			(*)		(*)
Green Sweet.....	Zelenka Sladkaya.....					
Grosser Bohu.....	Grosser Bohnapfel.....					
Half Glasny.....	Polusteklianka.....					
Handsome White.....	Biel Krasavitsa.....	(*)				
Hare Pipka.....	Saltchia Pipka.....					
Hare's Head.....	Hasenkopf (Saltchia Golovni).....					
Heidorn.....	Polosatska Heldorna.....					
Herron.....	Herrnapfel.....					
Hibernial.....	Osimui.....					
Imperial.....	Imperial.....			(*)		(*)
Imperial Citron.....	Tsitronnoe Tsarskoe.....					
Imperator.....	Imperatorskoe.....					
Ivory.....	Simnui Biel.....					(*)
Kalkidon.....	Khalkidonskoe.....					

Varieties.		Russian or German name.	Northeastern district: northern New York and northern New England.	District of Great Lakes: central and western New York, northern Ohio, and lower Michi- gan.	Wisconsin lake district: western shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wis- consin.	Southern prairie district: northern Illinois, south- ern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermountain prairie dis- trict: southern half of Wisconsin (west of lake district), northern third of Iowa, southern third of Minnesota and Da- kota, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two- thirds of Minnesota and Dakota, all of Montana.
Adopted or translated name.									
Boda.....	Bodeveskoe.....								
Bogdanoff.....	Bogdanoff (Biepkas).....								
Bogdanoff's Glass.....	Steklianka Bogdanova.....								
Bolken.....	Bolkenpfeil.....								
Bokoroe.....	Bokoroe.....								
Borkoff.....	Borkorokoe.....		()						
Borovinka.....	Borovinka.....		()						
Borodoff.....	Borodoff.....								
Basklonoff.....	Basklonovka.....								
Breakovka.....	Breakovka.....								
Broadcheek.....	Schirokolitchiko.....								
Broad Green.....	Nalivnoe zelenui schirokul.....								
Burda.....	Burlovka.....								
Bushboun.....	Bushboun.....								
Cardinal.....	Cardinal.....								
Champagne.....	Champanskoe.....								
Champagne Pipka.....	Pipka Champanskaya.....								
Charlanoff.....	Charlanovskoe.....								
Christmas.....	Roshdretvenskoe.....								
Cinnamon.....	Koritchnevoe.....			()					
Cinnamon Anis.....	Anis Koritchnevoe.....								
Cinnamon Pine.....	Koritchnevoe Ananasnoe.....								
Citronat.....	Citronat.....								
Citronen.....	Citronenapfel.....								
Crimea.....	Crimea.....								
Crimean Naliv.....	Krimakoe Nalivnoe.....								
Crooked Spike.....	Krivospitsoe.....								
Cross.....	Cross.....								
Czar's Thorn.....	Tsarskui Schip.....								
Dansig Pipka.....	Pipka Dantsigskaya.....								
Earliest.....	Skorospieltka Rannaya.....								
Early Champagne.....	Champagner Früher.....								
Early Cinnamon.....	Koritchnevoe Rannoe.....								
Early Grandmother.....	Labuschkinno Rannoe.....								
Early Pipka.....	Pipka Lietnaya.....								
Early Prolife.....	Podovitchka Rannaya.....								

Early Red.....	Skorspieloe Kraanoe.....					
Early Stripe.....	Polosatka Lietuaya.....					
Early Translucent.....	Skyvosenue Skorspieluaya.....					
Elser.....	Biserapfel.....					
English Borovinka.....	Borovinka Angliyskaya.....					
English Pippin.....	Englisoeher Popping.....					
Greenmous.....	Krapaceu.....					(*)
Kruber.....	Erbsenapfel.....					
Flat Iron.....	Miron Piskun.....					
Flat Voronezh.....	Voronozhloe Ploskoe.....					
Fondrie.....	Konarik Malynul.....					
Garden.....	Sadovskoe.....					(*)
Gedaminter.....	Gedaminter.....					
General Greig.....	General Greig.....					
German Calville.....	Niemetskui Kalvil.....	(*)				
German Lednets.....	Ledenets Niemetskui.....					
German Prolife.....	Piodovitsa Niemetskaya.....					
German Sprute.....	Sprute Niemetskui (Regele).....					
German a Bean.....	Germanuskul Bob.....					(*)
Gipses.....	Isiganka.....					
Glass.....	Steklianka.....					(*)
Glints.....	Glintsovo.....					
Golden Arcad.....	Zolotoi Arkad.....					
Golden Reuette.....	Zolotoi Renet.....					
Golden White.....	Biel Zolotovskaya.....					(*)
Good Peasant.....	Dobryi Krestianin.....					(*)
Gorko Pipka.....	Pipka Gorkaya.....					(*)
Grandmother.....	Babuschkino.....					
Great Mogul.....	Viliuk Mogul.....					
Green Anis.....	Anis Zelenul.....					
Green Astrachan.....	Astrachanskoe Zelenoe.....					
Green Butskaya.....	Butskaya Zelenka.....					
Green Crimean.....	Krimskaya Zelenka.....					
Green Glass.....	Steklianka Zelenka.....					(*)
Green Kubets.....	Rubets Zelenul.....					
Green Stranger.....	Tchuhenka Zelenaya.....					
Green Streaked.....	Zelenka Polosataya.....					(*)
Green Transparent.....	Skyvsnol Zelenul.....					(*)
Green Sweet.....	Zelenka Sladkaya.....					
Grosser John.....	Grosser Rohmapfel.....					
Half Glassy.....	Polussteklianka.....					(*)
Handsome White.....	Biel Krasavitsa.....					(*)
Hare Pipka.....	Saitchia Pipka.....					
Hare's Head.....	Hasenkopf (Snitchia Golovul).....					
Heldorn.....	Polosatka Heldorna.....					(*)
Herron.....	Herronapfel.....					
Hiberna.....	Osimul.....					(*)
Imperial.....	Imperial.....					
Imperial Citron.....	Tsitronoe Tsarskoe.....					
Imperator.....	Imperatorskoe.....					
Ivory.....	Slimul Biel.....					(*)
Kalkidon.....	Khalidonskoe.....					

Varieties.		Northeastern district: northern New York and northern New England.	District of Great Lakes: New York, northern Ohio, and lower Michi- gan.	Wisconsin lake district: western shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wis- consin.	Southern prairie district: northern Illinois, south- ern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie dis- trict: southern half of Iowa, southern third district), northern third of Iowa, southern half of Minnesota and Da- kota, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two- thirds of Minnesota and Dakota, all of Montana.
Adopted or translated name.	Russian or German name.							
Karabovka	Karabovka							
Keir Reinette	Renet Kerskul							
King's Stripe	Roth-stabiger K6ni;							
Kluskake	Kluskake							
Kolomenskoe	Kolomenskoe							
Kremor	Kremor							
Kremor's Glass	Steklianka Kremora							
Kruider	Kruider oder Blauer							
Kursk Anis	Anis Kerskul							
Kursk Reinette	Renet Kerskul							
Kustoe	Kustoe							
Landsburg	Landsburger Reinette							
Lapouchoe	Lapouchoe							
Lapouchoe Nallv	Lapouchoe Nalrnoe							
Large Anis	Anis Krupnui							
Large Long White	Biel Krupnaya Prodolgovathaya							
Large Prolific	Prodovitka Krupnaya							
Large Transparent	Krupnui Skrosnoi Nallv							
Lead	Svinsovka							
Ledeneta	Ledenets							
Leipso Boradorf	Boradorfer Leipziger							
Lejanka (Lieby)	Lejanka							
Lemon	Limonnoe							
Livland Muscatel	Muscatapfel Livlander							
Livland Raspberry	Himbeerapfel Livlander							
Lipin	Lipinskoe							
Lipka	Lipka							
Little Hat	Schapotchka							
Little Pipka	Pipka Malaya							
Little Repka	Reipka Malenkaya							
Long	Dimnoe							
Long Arcad	Arkad Dlinnoi							
Longfield	Langerfeldskoe							
Lubak Reinette	Reinette Liubskul							
Lutken	Lutkenapfel							
Marble	Marmornoe							

Varieties.		Northeastern district: northern New York and northern New England.	District of Great Lakes: general and western New York, northern Ohio, and lower Michi- gan.	Wisconsin lake district: western shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wis- consin.	Southern prairie district: northern Illinois, south- ern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie dis- trict: southern half of Wisconsin (west of lake district), northern third of Iowa, southern third of Minnesota and Ia- wota, northern half of Wyoming.	Northern prairie district: (omitting Lake Superior region), northern two- thirds of Minnesota and Dakota, all of Montana.
Karabovka	Karabovka							
Reinet Reinecke	Reinet Reinecke							
King's Stripe	Königsstahiger König							
Klieveskoe	Klieveskoe							
Kolomenskoe	Kolomenskoe							
Kremer	Kremer							
Kremer's Glass	Sieklanska Kremera							
Kruder	Kruder oder Blauer							
Kurak Anis	Anis Kurakul							
Kurak Reinecke	Reinet Kurakul							
Kustoe	Kustoe							
Landsburg	Landsburger Reinecke							
Lapouchoe	Lapouchoe							
Lapouchoe Nallv	Lapouchoe Nallvnoe							
Large Anis	Anis Krupaul							
Large Long White	Biel Krupnaya Prodolgovatnaya							
Large Prolific	Prodovitka Krupnaya							
Large Transparent	Krupaul Skvoenoi Nallv							
Lead	Svintsoyka							
Ledenets	Ledenets							
Leipsio Borsdorf	Borsdorfer Leipziger							
Lejanka	Lejanka							
Lemon	Limonnoe							
Livland Muscatel	Muscatapfel Livlander							
Livland Rasperry	Himbeerapfel Livlander							
Lipin	Lipiuskoe							
Lipka	Lipka							
Little Hat	Schapotchka							
Little Pipka	Pipka Malaya							
Little Repka	Repka Malenkaya							
Long	Dlinnoe							
Long Arcad	Arkad Dlinnoi							
Longfield	Langerfeldskoe							
Lubak Reinecke	Reinecke Liubokul							
Laiken	Laikenapfel							
Marble	Marmoraee							

Varieties.		Northeastern district: northern New York and northern New England.	District of Great Lakes: central New York, northern Ohio, and lower Michi- gan.	Wisconsin lake district: western shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wis- consin.	Southern prairie district: northern Illinois, south- ern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie dis- trict: southern half of Wisconsin (west of lake district), northern third of Iowa, southern half of Minnesota and Iowa, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two- thirds of Minnesota and Dakota, all of Montana.
Adopted or translated name.	Russian or German name.							
Raspberry.....	Malinovskoe.....							
Rasumoff.....	Rasumovskui Moschok.....							
Rattle.....	Gremnischka.....							
Red Anis.....	Anis Krasnui.....	(*)		(*)		(*)	(*)	
Red Arad.....	Arkad Krasnui.....							
Red Astrachan.....	Astrachaner Rother.....							
Red Black.....	Tchernokrasnoe.....							
Red Dorovinka.....	Dorovinka Krasnaya.....							
Red Jungfern.....	Rother Jungfern.....							
Red Miron.....	Miron Krasnui.....							
Red Nalt.....	Naltvnoe Krasnoe.....							
Red Petersburg.....	Petersburgskoe Krasnoe.....							
Red Pigeon.....	Rother Winter Taubenapfel.....							
Red Pine.....	Ananasapfel Rother.....							
Red Raspberry.....	Malinovka Krasnaya.....							
Red Reinette.....	Reinette Rother.....							
Red Kukin.....	Kukinskoe Krasnoe.....							
Red Serinka.....	Rother Serinka.....							
Red Sidel.....	Krasnobokoe.....							
Red Streak.....	Polosakoe.....	(*)						
Red Summer Calville.....	Kalvil Krasnui Lietnui.....							
Red Sweeting.....	Kras Sladkaya.....							
Red Titka.....	Titka Krasnaya.....							
Red Transparent.....	Skrusnoei Krasnui.....							
Red Wine.....	Weinapfel Rother (Herbst-Regel).....							
Repka.....	Riepka.....							
Repka Apurt.....	Riepichtnui Apurt.....							
Repka Arkad.....	Arkad Riepichtnui.....							
Repolovka.....	Repolovka.....							
Resonant.....	Zvonkoe.....							
Revel.....	Revelakoe.....							
Revel Borsdorf.....	Borsdorfer Reveler.....							
Revel Glass.....	Steklanka Revelakaya.....							
Revel Pear.....	Gruschucka Revelakaya.....							
Revel Pigeon.....	Taubenapfel Reveler.....							
Revel Streaked.....	Revelakoe Polosatoe.....							

Ribbed	Rebristoe					
Ribbed Naliv	Rebristoe Nalivoe					
Ribbed Rubets	Rubets rebristai nalivnoi					
Richard	Grand Richard					
Riepolovka	Riepolovka					
Riga Translucent	Skrvosnennia Rishakaya					
Riga Transparent	Rigaz Skvosnoi Naliv					
Romanoff	Romanovka					
Romenskoe	Romenskoe, also Romnenskoe				(*)	(t)
Romianka	Romianka					
Rosenbager	Rosenbager					
Rosy	Roscoe					
Rosy Apert	Aport Rosovui				(*)	
Rosy Repka	Repka Rosovaya					(t)
Rosy Voronesh	Voroneshskui Kosovui					
Round Borsdorf	Borsdorfer Runder					
Royal	Korolevskoe				(*)	
Royal Table	Fürstlicher Tafelapfel					
Rahav's Miron	Miron Rahevaki					
Rubets	Rubets					
Russian Calville	Kalvil Ruskui					
Russian Gravenstein	Gravensteiner Russischer				(*)	
Sandy Glass	Pesochinoe Steklianovoe					
Saxonian?	Saksonskoe ?				(*)	(*)
Scented	Duchlovoe					
Scented White	Biel Duchovaya					
Serinka	Sierianka					
Sheepnose	Schafnase					
Shepherd	Pastelovka					
Shining Aromatic ?	Steklinnoe Duchistoe ?				(*)	(*)
Silken	Schelkovka				(*)	(*)
Skute	Skute					
Slast	Slast					
Smoky Arad	Arkad Dimchatui					
Smolensk	Smolenskoe					
Spreading Pipka ?	Pipka Postlinaya					
Stepanov	Stepanovka					
Streaked Naliv	Polosatoe Nalivnoe					
Striped Calville	Kalvil Polosatui					
Striped Naliv ?	Polosatka Nalivnaya					
Stupka	Stupka					
Sugar Miron	Miron Sacharnui					
Sugar Sweet	Sacharnoe				(*)	(*)
Sultan	Sultaniapfel					
Summer Apert	Aport Liemnee				(*)	
Summer Livland	Livlandischer Sommer					
Summer Pear	Sommer Birnapfel				(*)	
Srinets	Srinets					
Swan	Lebedka					
Sweet Anis	Anis Sacharnui				(*)	
Sweet Apert	Aport Sladkui					

Adopted or translated name.	Varieties.	Russian or German name.					
		Northeastern district: northern New York and northern New England.	District of Great Lakes: central and western New York, northern Ohio, and lower Michi- gan.	Wisconsin lake district: western shore of Lake Michigan.	Lake Superior district: upper Michigan and a portion of northern Wis- consin.	Southern prairie district: northern Illinois, south- ern two-thirds of Iowa, Nebraska, southern half of Wyoming.	Intermediate prairie dis- trict: southern half of Iowa, southern third of Iowa, northern third of Minnesota and Da- kota, northern half of Wyoming.	Northern prairie district: northern Wisconsin (omitting Lake Superior region), northern two- thirds of Minnesota and Dakota, all of Montana.
Sweet Borovinka	Borovinka Sladkaya						
Sweet Cross	Skrjapel Sladkui						
Sweet Musk	Mtenskoe Sladkoe						
Sweet Pear	Grushevka Sladkaya		()				
Sweet Pipka	Pipka Sladkaya						
Sweet Prolific	Plodovitka Sladkaya						
Sweet Streaked	Polosatoo Sladkoo						
Switzer	Sulalepper	()					
Tashkin	Tashkinskoo						
Tetolski	Tetolski						
Thaler	Charlottenthalakoo Jeltee	()					
Thin Twig	Tonkovietka Polosataya						
Three-sided	Tocherezichnomoo						
Tiesenhausen	Tiesenhausenskoo		()				
Titovka	Titovka	()					
Transparent	Skvoeneena						
Transparent Astrachan	Astrachanskoo Skvosnoo						
Transparent Nally	Skvosnoi Nally						
Ukraine	Ukrainskoo						
Vargul	Vargul						
Vargulek	Vargulek						
Vincoe	Vincoe						
Violetakoo	Violetakoo (Visoletakoo)						
Vochin	Vochinskoo						
Vochin's Crimean	Krimskoo Vochina						
Vorgunok	Vorgunok						
Voroneah Arcad	Voroneashkoo Arkad						
Voroneah Cinnamon	Voroneashkoo Koritchnevoe						
Voroneah Reinette	Reinette Voroneashkul						
Vorochapel	Vorochapel						
Watermelon	Arbuzovakoo						
Wasen	Vokovoo						
Wasen Arcad	Arkad Kringul Voskovul						
Wasen Nally	Nally Voskovol						
White Aport	Aport Bienu						
White Astrachan	Astrachanor Weissor						

White Borodovka	Biel Borodovakoe				
White Crimean	Krimakaya Biel				(*)
White Nally	Nalynoe Bielni				(*)
White Pelikanoff	Biel Peilkanovakaya				(*)
White Pigeon	Golubinoe (Violetnot Regel)	(*)			
White Reinette	Reinette Bielni				
White Rubeta	Rubeta Bielni				(*)
White Russett	Bielvnoe Jeltosieroe	(*)			(*)
White Sprute	Skrut Bielvol				
White Summer Calville	Calvill Welser Sommer				(1)
White Swan	Bielaya Lebedka				
White Sweet	Bieloe Sladkoe				(*)
White Transparent	Skyvanol Bielni				
White Vechin	Biel Vechina	(*)			
White Rubeta	Rubeta Vinogradnui	(*)			
Winter Port	Aptovnoe Snirooe				
Winter Pass	Spekhannoe Snirooe				(*)
Winter Lirland	Lirlandacher Winter				(*)
Winter Fear	Winter Birnapfel				
Winter Streaked	Poleatka Siniyaya				
Yellow Anis	Anis Jeltui				(*)
Yellow Arcad	Arcad Jeltui				
Yellow Calville	Kalvil Jeltui				(*)
Yellow Kely	Kievskoe Jeltoe				
Yellow Lemon	Limonnoe Jeltoe				
Yellow Nally	Jeltui Nally				
Yellow Frolic	Podovitska Jeltaya				
Yellow Stettin	Gelber Stettiner				
Yellow Sugar	Sacharnoe Jeltoe				(*)
Yellow Sweet	Sladkoe Jeltoe				
Yellow Transparent	Skyvanol Jeltui	(*)	(*)	(*)	(*)
Yellow Zaporitnoe	Zaporitnoe				
Zelenka	Zelenoe, Zelenka				
Zolotareff	Zolotarevka				(*)
Zussoff	Jussow's Winterapfel				(*)

In addition to these very many are referred to by numbers, but in such manner that it is difficult, if not impossible in most cases, to determine to which list they properly belong. Numbers and duplicates are excluded from this tabulation, and the names arranged alphabetically, with the hope to hasten the disuse of numbers, and in so doing escape a fruitful and vexatious source of error.

It is quite generally conceded that these Russian importations have yielded several early varieties of apples fully equal, if not in some respects superior, to any of our older native varieties of similar season, and that these are hence likely to prove valuable even in regions in which their superior hardiness is not specially important.

The most serious complaint respecting these importations as a whole is found in the fact that in the latitude of southern central Iowa, to which they come mainly from a region lying from 8° to 12° farther north, the transfer to a more southern and longer summer so hastens the maturity of their fruit, that the most of them become late summer and autumn fruits, failing partially, if not wholly, of a winter supply, which would be more specially desirable.

Although the full import of such change can only be determined upon the general distribution and fruiting of these introductions, which must yet require several years, this claim (which receives more or less confirmation from the fruiting of some of the earlier introductions) finds much support from the behavior of our native varieties, when thus transferred, even for short distances, within our own country.

It is urged, on the other hand, that while southern Iowa and Nebraska can depend with more or less certainty upon their ability to produce a supply of this fruit from some of the hardiest of our American varieties, farther north these utterly fail, and that in such localities, even including whole States and Territories, the question, practically is, *apples or no apples*, while with their shorter seasons the objection of pre-maturity partially or wholly disappears.

It is also very forcibly urged that the objections are being made upon results from the earlier importations, which mainly came from near the sea-coast, where the climate differs widely from that of the steppes, whence the later and mainly untested importations have come; also that the alleged pre-maturity can not be properly estimated by degrees of latitude, but rather by isotherms; and that from this stand-point, if we trace the lines of equal summer temperature (as a guide to determine the relative seasons of ripening), the season of central Iowa will be found to correspond with that of the region in southeastern Russia, 10° or 20° farther north, whence the mass of these later importations came.

In urging this consideration, Professor Budd insists that "so far as the winter apples of south central Russia have yet fruited in Iowa, they prove as good keepers as in their native home. In like manner, our samples of fruits and our reports from our many trial stations north

show that the apples from provinces in Russia farther north than Saratov mature almost exactly in accordance with the lines of summer heat traced by Professor Dove across the two continents."

Should the conclusion be accepted that the season of maturity is dependent rather upon thermal lines than upon parallels of latitude, it appears equally probable that variations of flavor or quality are similarly affected. Although this may lack the authority of a determinate conclusion, it may be supposed to warrant the inference that the recognized deficiency of quality in the sea-coast varieties first imported was the result of causes not to be predicated of those more recently introduced, which may, in such case, be expected to more nearly retain their pristine characteristics. For these reasons, if for no others, it would seem wise to give to these the benefit of a full and fair trial before sitting in judgment upon them.

Besides the recommendations of particular varieties already tabulated, there are numerous notices, both favorable and unfavorable, which more or less fully indicate in what lights these, as a class, are viewed by those interested in such matters. In quoting a few of these the localities in which they occur will be indicated.

Dr. T. H. Hoskins, of northern Vermont, in *Rural New-Yorker*, says:

I have fully 100 varieties of Russian apples growing in my grounds, many of the trees being sixteen and eighteen years planted, while some of the later importations are small. One thing is fully demonstrated, viz, that these apples are, as a class, very much hardier against adverse climatic influences, and especially against winter's cold, than those previously grown on this continent. This alone gives them enormous value for the "cold North" where, without them, tree fruit culture would be impossible. In productiveness, size, and beauty of fruit the Russian apples are, on the average, more than a match for those of western Europe and for our native seedlings thence derived. Those who have an extensive acquaintance with Russian apples know that there is among them quite as large a proportion which deserve to rank as of dessert quality as there is among the common sorts.

An article from the same pen, published in the *American Garden*, in September last, indicates a possible change in the writer's conclusions upon the subject. He says:

The entire "cold North" is awaiting with anxiety the coming iron-clad long-keeping apples, which it so greatly needs, yet can hardly produce. Experience is showing that the Russian long-keeping apples grown between latitudes 55° and 65° are not long keepers in latitudes 40° to 50°, which is the American territory where the iron-clads must be grown.

George P. Pepper, of the Lake region of eastern Wisconsin, says:

Nearly all the Russian apples I have fruited ripen in summer or early autumn, and retain their flavor but a short time. Antonovka gives the best satisfaction of any yet fruited. There are some winter [reputed—WRITER] apples among those not yet fruited.

He says again:

The public will find that there is as much risk in planting Russian varieties as any others. I hold that fruit trees, to give satisfaction, should be grown from seed raised near the locality where wanted.

George J. Kellogg, reporting as delegate from Wisconsin to the Illinois Horticultural Society, remarks: The apple question in Illinois is but little nearer solved than in Wisconsin and Minnesota. Half the orchards in northern Illinois are on the wood-pile and the other half are leaning strongly that way.

A. G. Tuttle, of central Wisconsin, says:

We have been a good many years trying to learn what is in the Russian apples, and have tested 150 varieties, which certainly compare with the varieties usually grown in Wisconsin. Some are equal in quality to the Northern Spy and Grimes' Golden. We have scarcely two varieties that are not better than Oldenburg.

He adds:

So far as the south half of Iowa is concerned, my impression is that they do not need Russian apples. I am speaking more particularly about the cold northern climate.

On another occasion he remarks:

I have 80 varieties of Russian apples in orchard. All seem hardy but one.

Again says Mr. Tuttle:

The true crabs are tender. They start too early; wake up too soon.

At the Minnesota State Fair, in 1886, Mr. A. G. Tuttle, of Wisconsin, exhibited 75 varieties of Russian apples, probably the most extensive display of this class of apples ever made by a single grower in the United States.

Of these the examining committee speaks as follows:

The best keepers shown here were Repka, Arabskoe, Mensk, Vargul, Antonovka, and Blue Anis.

In quality they rank as follows:

Vargul, Antonovka, Repka, Blue Anis, Mensk, Arabskoe. The samples were too immature to judge of flavor, but Vargul and Antonovka, which resemble each other, are much finer in texture and evidently much better than Oldenburg. [Not very high praise.—WRITER.]

In size, Mensk, Arabskoe, Vargul, and Antonovka are said to be large apples, Blue Anis is medium, and Repka is small.

Arabskoe has blighted in twigs; but otherwise the above are said to be thus far free from blight, and all are as hardy as Oldenburg.

Among the early winter sorts, the committee was most pleased with Golden White. The season of Hibernial, Zussoff's Winter and Red Queen (December); Long Arcad (November and December). In quality this test ranks, Golden White, Long Arcad, Zussoff's Winter, Red Queen, Hibernial.

In making a report a member of the committee remarks:

In conversation Mr. Tuttle admitted that blight is the greatest enemy of the Russian varieties. We could not tell from the looks of the fruit how much the trees blighted; but from my own experience, I find that those varieties that do not kill by blight do not bear very much.

At the annual meeting of the Minnesota Horticultural Society in January, 1887, Mr. Tuttle exhibited four sections of the wood of crabs,

nine sections of hardy native apples, and twenty-five sections cut from Russian apple-trees. The sections were said to have been cut from trees which had been planted ten years, and to be fair samples of each variety; and were reported by the examining committee as giving evidence that twelve of the Russian varieties were hardier than Oldenburg, or any of the American varieties.

On another occasion Mr. Tuttle says:

At least twenty-six varieties of Russians will compare favorably with Oldenburg for hardiness, and are as good in quality as an equal number of American varieties.

Menominee is situated at the north of Menominee River, on Green Bay, just upon the boundary between Wisconsin and the upper peninsula of Michigan, partaking largely of the climatic peculiarities of the latter. Mr. S. Running reports from there:

The thermometer last winter (1886-'87) sank to -40° and below, and remained there for about a week; but that is less than has been usual for the past three years. I have just come in from examining the trees, and find the following, which I have growing in the nursery row, to be entirely hardy: Lou, Florence, October, Martha (received from P. M. Gideon, of Minnesota), Whitney, Hibernial, Ostroff's Glass, also Hyslop, Transcendent and Marengo crabs. Then follow Oldenburg, Tetofski, Yellow Anis, Charlamoff, and Little Pipka, with the terminal bud and an inch of wood slightly discolored. Then come Thaler, Yellow Transparent, Prolific Sweet, McMahon's White, Scott's Winter, and Iowa Russett, with a trifle more discoloration. Then come Iowa Blush, Wealthy, Alexander, Longfield, and Switzer, with still more discoloration. Lastly, I think Borsdorf, Wolf River, Walbridge, Plumb's Cider, St. Lawrence, and Fall Orange are too tender for this locality.

I also have Clapp's Favorite, Flemish Beauty, and Keiffer pears growing in nursery rows, all of which are killed to last winter's snow-line.

J. C. Plumb, of Wisconsin, in the *Prairie Farmer*, says:

Where the once despised Oldenburg and little Siberians were thought too inferior for general planting, they now make all—and often a good all—of the home supply of apple fruit. Where this is the rule, the new Russians are a Godsend. They have come to stay, and will no doubt immensely extend the area of successful apple-growing in the Northwest. We have been growing them about twelve years, and yearly examining and testing new varieties as they have come into fruiting; and, as is known here, have been very cautious in our commendation of them, for they have serious faults as well as great virtues. I have yet to see a good long-keeping apple among them. The "very hardy" are all too coarse fleshed to be good winter fruit; nor do I expect to find any Seek-no-Further, Grimes' Golden or Winesaps among them for reasons physiological, which I have not room here to discuss.

In the same issue Mr. Tuttle quotes Hon. C. L. Watrous, of Des Moines, Iowa, as saying:

Of the 300 varieties of apples on trial a few have fruited; and, with a single exception, the fruit has been of the very lowest quality—thin, sour, and poor; with, too often, a twist of bitterness simply atrocious.

In replying to this Mr. Tuttle remarks:

That all of the 100 varieties fruited are of the very best quality no one would claim; but that they are, as a collection, equal in quality to our American apples there is not a shadow of doubt. * * * The percentage of loss in my Russians, including over 100 varieties, is not one-tenth of that in my orchard of Oldenburgs of 300 trees.

In southern Iowa, whence the doubts respecting the value of the Russian importations seem mainly to arise, Hon. C. L. Watrous says:

I do not think it is the general belief of the men of this (Iowa Horticultural) society that the Russians are going to produce a winter apple that will be hardy here in Iowa, and I think we should be very careful of our utterances on the subject.

R. D. McGeehon, of southwestern Iowa, remarks:

I am at a loss to say what apples I should plant. If Professor Budd has not got them among his Russians, I do not know where to look for them.

Professor Budd states:

We have 800 experimental stations throughout the Northwest; and we have gone through tests, and arrived at conclusions on this subject such as we could not have reached in a quarter of a century by ordinary means. From these importations from Russia we expect to get quite a number of varieties as good in quality as Grimes' Golden.

The work at the college consists chiefly in testing new varieties from Europe and elsewhere. Cuttings and seeds from these are sent out to the stations under an agreement not to propagate, sell, or give away any stock received for trial.

In the Rural New Yorker of October 1, 1887, Professor Budd says in substance:

We find the Longfield apple to be a native of Sarepta, on the Lower Volga, where the rain-fall is light and the summer heat often reaches 106° in the shade, with only 20 per cent. of moisture in the air.

Literally without rain to wet the roots of plants, the Longfield, and its near relative the Good Peasant, have matured a full crop of fruit of nearly average size. Even as far north as Baraboo, Wis., the Longfield has stood quite as well as the Wealthy, although this has not missed a crop of fruit on Mr. Tuttle's place for the last six years. The Longfield is not a true iron-clad for the North; but, if not cut too severely for scions, it has stood fully as well as the Wealthy on dry soils.

So far in central Iowa the Bogdanoff has shown no defect, save an occasional show of twig blight on black soil and in sheltered positions. Grandmother (469 Department list) failed with us in 1884 and 1885, and we have dropped it from our trial list; but the Grandmother, received by us from Moscow and Varonush, appears to be as hardy as Oldenburg, and promises to be a true iron-clad for northern Iowa. I think the true Grandmother will prove hardy in any part of Vermont, yet it may not be as perfectly at home there as in Iowa.

Red Astrachan is a Swedish apple, a supposed seedling of Red Transparent. The latter is hardier than Oldenburg, but Red Astrachan is very little hardier than Fameuse. The Department Borsdorfs lack hardiness, but Zweibel Borsdorf of central Russia is a true iron-clad. Alexander is hardy at Ames, but especially subject to blight and a shy bearer. On the other hand, the Aports of central Russia are perfect in tree, good bearers, and some of them fairly good keepers.

In the report of the Iowa society for 1886 appears the following:

On ordinary prairie soils, over an extent of the West equal to half a dozen of the small kingdoms of Europe, the home and commercial orchards are killed or hopelessly crippled to an extent not heretofore known in the history of this country or any other. Timber soils have not sustained their reputation as favorable orchard-sites in Iowa, Indiana, Wisconsin, or Illinois. Even so far south and east as La Fayette, Ind., the fine young orchard on the grounds of Purdue University has been grubbed, without the reservation of a single tree, although it stood on hard maple land, which had hitherto been thought favorable for the apple and the cherry.

It is further stated that the injury of so-called hardy varieties was not in the top; that trees top-worked on hardy stocks were comparatively sound, even though the same varieties root-grafted failed to show a perfect leaf. It is also stated that the most successful apple-trees at the West generally, on various soils, have been of Russian or Siberian stock.

In 1887 E. B. Porter, of Delaware County, Iowa, reports :

That the old orchards are dead is a fact that stares us in the face from Indiana to Nebraska and south to central Illinois and northern Missouri. Some imagine that we in northern Iowa are peculiarly unfortunate in this regard, but there has not been a crop of apples raised in central Illinois in five years.

The report says further, in effect :

Through the progress of centuries the apple has become acclimatized throughout Europe. The great central plain of Russia is very similar to our great central plain. There the summers are hot enough to perfect Indian corn; the rain-fall is not greater than ours. There the mercury sinks lower than here in winter, and reaches at least as high in summer. There, as here, the winds sweep down from the Arctic Ocean with no intervening mountains. These facts are held to justify the expectation that out of the importations from those regions will come a supply of varieties adapted to meet the requirements of our climate; and among these are mentioned Yellow Transparent, Tetofski, Thaler, Longfield, Antonovka, and others.

J. B. Mitchell, living near the north line of Iowa, who has had thirteen years' experience and has a hundred varieties of Russian apples, in replying to Mr. Watrous in the *Prairie Farmer* says :

With Mr. W.'s experience, in a more favorable locality for the growing of the old varieties of apples (130 miles south of me), there may be some reason for his conclusion of their relative hardiness and healthfulness as compared with the Russian apples. The latter are more dwarf and slower growers generally than the former, and where the climate will admit of growing the old or American varieties they doubtless make a better appearance in nursery. But here at the north line of the State the old varieties are not to be compared with the Russian in hardiness, healthfulness, and fruitfulness. Many of the latter have come through the winters nearly perfect, while of thousands of trees of the American varieties planted in this vicinity all have disappeared. It is not claimed by Professor Budd, or any one I believe, that all of the Russians are hardy enough for the North, or that all will endure the heat farther South; but there are very few of those tried here which have not stood better than any of the American sorts. Many of them are indispensable to the Northwest; and it is a stubborn fact that they have come to stay, even if the fruit is not all of the first quality. Of those I have fruited, with two exceptions, I have noticed none of the bitterness spoken of, and then only a slight trace, while some are of very fine quality, and I think they will average well with the old kinds. Nearly all said against the Russians has come from localities farther south, where the old varieties have done very well, and where extreme hardiness is not so essential.

H. Friedly, Mineral Ridge, Iowa, has been growing apples a number of years, and has the finest and largest bearing orchard in Boone County; but the recent cold winters killed all except a few Russians. He then procured from the college eighteen varieties of Russian apples, which he planted in 1884. Six of these have now produced fruit, which is of fine appearance, and compares well with our common varieties. Root-grafts of fifty additional varieties, more recently planted in nursery, have all proven harder than our common varieties beside them.

W. C. Haviland, of Fort Dodge, Iowa, in *Prairie Farmer*, says :

The days of Grimes' Golden and Jonathan are past; and-of the tried sorts we only have Wealthy and Whitney left. Already the half-hardy sorts, like Fall Queen (Haas) and Fameuse, have given place to Russians, such as Yellow Transparent and Longfield, which prove 20 per cent. hardier. He mentions a few others in the order of their relative hardiness, so far as known, viz: Antonovka, Cross, Hibernial, Arabskoe, Borovinka, Arabka, Charlamoff, Switzer, Yellow Anis, Red Anis, Silken, Thaler, Longfield, and Little Pipka.

Edward Reeves, Waverly, Iowa, takes the following conservative and doubtless correct view of the matter in *Prairie Farmer*, page 618 :

I think it high time to warn planters against the present craze for Russian trees, or trees from any other place which have not been fully tried in our climate and proven of value. At the meeting of the Iowa Horticultural Society at Charles City, last winter, Mr. Watrous asked Mr. A. G. Tuttle to name the varieties of Russian apples which had proven of value in Iowa; but he failed to name a single one. * * * I have over forty varieties of Russian apples on my grounds, a number of which have so far stood better than Oldenburg; but I am not prepared to recommend them to my customers, except for trial. I believe that some of these will prove valuable for general planting and for crossing.

In *Prairie Farmer*, page 634, John C. Ferris, secretary Northern Iowa Horticultural Society, says :

My experience with Russian apples is very much at variance with that of Captain Watrous. It is well known that the list of apples recommended for northern Iowa, by the Northern Iowa Horticultural Society, includes but four varieties from the old list, viz: Oldenburg, Tetofski, Whitney, and Wealthy. If the last two are hybrids, as claimed by their originators, then, the other two being Russians, there is not an apple of American origin and parentage on our list. We saw no reason why the two Russians first introduced should necessarily be the best; and hence were glad when many varieties were imported from Russia. These had a perfectly reliable record as to character of fruit, which placed many of them far ahead of either Oldenburg or Tetofski. We began experimenting with these, and their hardiness is now an established fact among northern Iowa nurserymen, who have tested them from four to twelve years.

He goes on to remark that, although we could doubtless in the course of time originate a race of hardy apples adapted to this region, the climate of Russia has performed this work for us, and if we do not avail ourselves of it we will, indeed, be foolish. After a reference to the value of the Russian varieties as the possible basis for further improvement he adds:

The problem for us to solve, after the rejection of the tenderest Russians and those most subject to blight, is, which are the best bearers, the best keepers, and of the best quality.

E. De Hill, president of the Dakota Horticultural Society, assured him that he had eaten Russian apples as good as the Rhode Island Greening.

Hon. R. P. Speer, in *Iowa Horticultural Report* for 1887, says:

In central Minnesota there is usually an abrupt jump from beautiful fall weather to winter; and the springs also are less changeable than in Iowa. There the crabs and their crosses upon the common apple may be of some value, but in Iowa they are worthless.

On another occasion he says :

In 1874 I procured two each of seventy-six varieties of Russians, and planted them alongside of our hardiest kinds. Some of them have been hurt at the tips, and some are slow growers, but twenty-six of them I consider perfect in tree.

He thinks his trees of the Arabka family will stand at Lake Superior.

In *Prairie Farmer*, page 650, he states that he planted thirteen of the very promising varieties in orchard, and only two of these have proved less hardy than Oldenburg. Two of the hardy varieties have suffered from blight, viz: Basil-the-Great (Vassilist's Largest) and a variety of the Arabka family. Four of the other nine have proved fruitful and very valuable.

I have now more of one, two, and three-year old Russian apple-trees than any other American. I have examined them carefully, after our coldest winters and severest droughts, and am very sure that many of them are more valuable in every respect for Iowa than the Oldenburg.

J. B. Mitchell reports to the Northern Iowa Horticultural Society—

That the once so-called iron-clad list has proved a failure; that none except the Oldenburg have been able to endure the test winters of our climate; and from the fact that many of the Russians have been grown at the most northern limit of our State for ten or twelve years past, and have stood uninjured, or nearly so, in nursery and orchard, it seems that we have much to hope from the Russian apple.

At the same meeting A. L. Hatch remarks :

A good deal of discouragement prevails with regard to standard apples, and what little faith we have left, is in Patton's seedlings and Budd's Russians; and the Lord grant that our faith may prove well founded.

Hybrid crabs are doing well, except the usual amount of blight.

W. H. Guilford, superintendent of Experiment Station, reporting to the Dubuque County Horticultural Society, says :

We purchased thirty-seven trees from the horticultural department at Ames, Professor Budd making the selections for us, and from all that we can learn every tree is of decided merit. The collection is composed of plums, cherries, pears, and apples.

Blessings sometimes come to us in disguise; and it now seems as though the four unprecedentedly hard winters had been such. Nearly all the tender, trashy rubbish with which the country has been littered is either dead or dying, and we have learned a wholesome lesson for our future guidance.

In a report for Grundy County, O. A. Bardahl says :

The county of Grundy is new, compared with other counties in our district, consequently fewer trees have been planted; but I have no doubt that thousands of dollars have been sent out of our county for fruit trees within the last fifteen years, without a single tree to-day giving promise of another apple, except a few Oldenburgs.

The Russians from the college are terribly slow growers, but they afford us our only apparent promise.

Since the fact has come to be recognized that the fruits of the Eastern States are not successful in the prairie regions, there has been a constant effort to devise or discover some effective means for the origination of a local pomology for the supply of the urgent need. Besides the efforts of the national Agricultural Department, which, with Mr. Tuttle and Professor Budd, has undertaken to import a pomology for

the purpose, and the persistent efforts of P. M. Gideon to elaborate the desired result from the crab. Mr. C. G. Patten, of Charles City, the president of the Iowa Horticultural Society, has been an active laborer in this field. While he has done much in the planting and fruiting of the introductions from Russia, he has been but illy satisfied with the results.

A visit to his establishment not only shows sad losses among the old varieties, but also that many of the supposed hardy Russians are seriously defective in hardiness, at least for this locality. The Oldenburg here, as in most other trying localities, is winning a reputation for superior hardiness; but Mr. Patten, not content to stop here, is actively engaged in the work of improvement by the process of cross-fertilization with some already encouraging results.

Prof. E. D. Porter, who is in charge of the University Farm, at the summer meeting of the Minnesota State Horticultural Society, held at that establishment, invited attention to the horticultural improvements, and among other things to the orchard and nursery. There was an orchard of Russian apples, one year planted. The trees had been obtained from Mr. Gibb, of Canada, and Professor Budd, of Iowa. He added:

We have duplicates of these growing from root-grafts in the nursery. The idea is that if there is found to be anything valuable when they come into fruiting we can duplicate them by the hundreds in the nursery. These varieties of apples will be grown for distribution among the farmers and horticulturists of the State.

O. F. Brand, Minnesota:

I had sixty-five varieties of the first that were sent out by the Department, which I propagated, and I got most of them large enough to bear. Where the Wealthy bore, from trees planted the same year, a bushel and a half to the tree in 1881 and 1882, there is not a tree of the Russian varieties that has borne half a bushel. There are several varieties of trees that remained, which were root-grafts in 1874, and some of them were grafted two or three years previous to that. Of those that remain there are only two varieties that are good for anything, and they bear very little. So I class the Russians like this: Most of them blight; and of those that remain, which bear, three-fourths are good for nothing, and the remainder do not bear enough to be good for any purpose, except to make up a collection for a fair.

My experience is that young trees stand very well; and after beginning to bear, at the age of eight to twelve years, are killed out, and the Russians likewise. They may do well for a while, but after they begin to bear and the vitality is reduced, they are unable to stand the winters.

I have eight or ten Oldenburgs that have been planted twenty years this spring, which appear good for as many years more.

To the foregoing Mr. Pearce responds:

Mr. Brand has put Russians in a bad light, and it does not coincide with my observation, nor yet with that of a number of other members present who have orchards in this section of the country. I refer to Andrew Peterson's orchard. He has trees twelve years old, and has twenty-five or thirty Russian varieties. His trees have borne well, and some of the fruit is of fair quality. I have watched his trees with much interest, and have never found trees that were more healthy or prolific. The fruit is large. I have known the Yellow Transparent a number of years. It bears freely, and the fruit is of good quality.

Mr. Corlett adds :

In the spring of 1880 I procured forty-three varieties of Russians from Professor Budd. I divided the collection with five neighbors, at his request, to test them on different soils. My own is what is called high prairie. The past season the branches of several were so loaded with fruit that they required to be propped up to prevent breaking. I had previously successfully grown such varieties as Dominie, Early Harvest, Sops of Wine, Winesap, Ben Davis, Benoni, etc., but none of them are now left, and my only hope is in the Russians.

Peter M. Gideon, of Excelsior :

I got a good many of the Russian varieties in scions, and planted the trees some years ago. The blight destroyed all but three of the trees in the orchard, and the fruit of those proved worthless. Afterward I had some two hundred and thirty varieties, but the blight destroyed most of them. Four years ago I had some seven thousand orchard trees. Over two thousand went down entirely, and others were damaged. I still had twenty Russian varieties left, but two years ago took most of those. Only two of the list bore last season.

The cause of the injury two years since was a severe freeze while the trees were yet in a growing condition.

Professor Porter, of Minnesota, Report for 1881, says :

I think we have much yet to learn in the acclimation of the Russian apple before it will prove entirely satisfactory. That it has some good points all must admit; coming as it does inured to rigorous cold, we hope it may prove all that its most sanguine friends anticipate. With these, as with all other new varieties, we should be cautious concerning extensive planting until fully persuaded that success is perched upon its banners.

Charles Luedloff has under trial about one hundred varieties of Russian apples, together with other fruits, but few of which are yet at fruiting age. He had large fruiting orchards, but the winter of 1884 and 1885 injured them seriously. He is since giving attention to Russian varieties, together with promising local seedlings.

The "*ad interim*" committee of the Minnesota Horticultural Society, on visiting Andrew Peterson, of Carver County, found Hibernial, Ostroff, and Lejanka in perfect health and in good bearing condition. Mr. P. thinks Hibernial and Lejanka may prove identical.

In the committee's report they say :

Our observations of Russians lead us to believe that out of the many hundreds of varieties being introduced, we may get a score or so that will be hardy enough for the whole region called the Northwest, and we doubt very much if the quality and productiveness of one-half that number will prove satisfactory to our people, and not more than four or five will fill the bill as long keepers.

Mr. A. W. Sias, reporting on seedling fruits, says :

Mr. Somerville showed us some of the most beautiful apples that our eyes ever beheld ; these were new Russians, which we propose to designate Russian Wax, unless we can obtain the true name.

He considers Autumn Streaked as giving the highest indications of hardiness among the Russian apples, and places White Russett as second in this respect, giving the third place to a variety designated as Plikanoff's Small.

He names as the best six Russian apples with him: Autumn Streaked, Russian Green, Juicy Streaked, Green Transparent, Red Cheeked, White Russett.

Best six with William Somerville: Oldenburg, Autumn Streaked, Russian Wax, Charlamoff, Winter Aport, Unknown.

E. H. S. Dartt, in reporting for a portion of southern Minnesota, says:

In regard to Russian varieties, I will say we had a large list of them under cultivation prior to 1885, and I had a good deal of faith in them; but that winter was too much for nearly all of them.

My orchard is Oldenburg and Tetofski, and I believe it has paid me better per acre than any other land that can be found in Steele County that has been used for any other purpose. I have kept account of my apples, and I estimate that my orchard of 18 acres has netted me about \$300 or \$400 per acre, besides trouble and expense and the cost of the land at \$100 per acre. I have a new orchard, set since the hard winter with five hundred Oldenburgs.

At a meeting of the Minnesota Horticultural Society in January, 1887, Professor Porter reported in substance as follows:

In the spring of 1885, root-grafts of one hundred and seventy-nine varieties of Russian apples were obtained from Professor Budd, of Iowa; also fifty-six varieties of two-year-old trees. The experimental orchard stands upon a level piece of prairie, with a low, wet spot in the center, and with an entirely open exposure. Of fifty-two Oldenburg trees but five died; showing that not more than one-third of the Russian varieties are as hardy as Oldenburg. Number of trees planted, one hundred and fourteen, of fifty-seven varieties; 32½ per cent. of the trees are dead.

Thirty-four additional varieties were planted in the spring of 1886. The orchard now contains eighty-one varieties of apples.

Certain varieties have proven worthless, and should be rejected; although some of these may succeed elsewhere. A single station can not therefore do this work satisfactorily. At the farm (near Minneapolis) conditions are essentially different from those farther south. Instead, therefore, of two fruit stations under State control, we need at least four, with dozens of substations.

Some of the Russian importations promise to prove of great value.

A. W. Sias, of Rochester, southern Minnesota, as superintendent of the Experiment Station at that place, says:

In referring to my report of last year, I discover that I erred in not heading it an *obituary notice*. The mortality was so sweeping in its results two years ago that we have but little to report upon at this time. But in this great loss we are again forcibly reminded of that saying so full of meaning to the intelligent horticulturist—"the survival of the fittest."

Without stopping to itemize, I will say that all of our trees with thick, pubescent leaves came through the severe winter two years ago in good shape, and have behaved first-rate ever since, notwithstanding they had to pass through a fiery ordeal last summer. Such trees are equal to every emergency.

At Moorhead, northern Minnesota, R. M. Probstfield reports that he received from Professor Budd the following varieties of Russian apple-trees: Summer Calville?, Ledenets, Royal Table, Romenskoe, Kursk Anis, Lead, Rosy Pipka, Ukraine, and Antonovka, which did well, notwithstanding the hot, dry summer, and went into the winter in good condition.

Transcendent Crab was bearing heavily, but blight was thinning out the trees rapidly.

At Albert Lea, southern Minnesota, Clarence Wedge reports :

Some of these new Russians are pretty well past the experimental stage.

G. W. Fuller, Litchfield, central Minnesota, says :

We had full crops of Early Strawberry, Transcendent, Beach's Sweet, and Minnesota crabs, a very few Oldenburgs, and still fewer Wealthies.

Thomas Frankland, writing from Manitoba, says :

Several varieties of crabs are found to succeed at Hendingly, and out of quite a number of Wealthy apples planted some fifteen years ago two yet survive. Other persons have tried apples ; but having, as I contend, planted unsuitable varieties, they have failed to keep them alive beyond the third year. Some of the Russian varieties give promise of hardiness.

In a paper entitled Fruit-Growing in the Northwest, J. S. Harris says, in effect :

From the early settlement of the country many of the Eastern varieties succeeded for a time, but the winter of 1882 and 1883 destroyed trees by the thousands, totally annihilating hundreds of orchards of the old favorite varieties.

Ten or twelve years of successful replanting with supposed hardy varieties followed ; till, in the winter of 1885-'86 a disaster as serious as the first overtook us. A summer drought and early frost had matured the growth. September, October, and half of November were wet and warm, starting a new growth. Winter shut down suddenly, was long and severe, and the deep snows prevented freezing of the ground.

Looking to the future, he feels great confidence that among the importations from Russia, or the originations of Gideon, a remedy will be found, and a safeguard provided against the recurrence of such a calamity.

William Selbie, writing from Deadwood, Dak., says :

I have quite an orchard planted at my ranch, and expect to have over a barrel of apples this year. I think this country, in the immediate vicinity of the hills, is admirably adapted to horticulture.

John C. Ferris, secretary Northern Iowa Horticultural Society, when at Bismarck, Dak., saw Tetofski and several hybrid crabs in fruit. In Minnehaha County, in southeastern Dakota, there are many trees of Oldenburg and Wealthy and some of Fall Queen (Haas) in bearing.

THE QUINCE.

The common Quince (*Cydonia vulgaris*) is indigenous in southern Europe and eastern Asia. It is said to have first attracted attention in the Island of Crete, from the ancient name of which its botanical title is derived. It is successful in New England, and westward to and including Michigan ; but even within the influence of the Great Lakes it is not successful to any considerable distance north of latitude 43°, while it succeeds but indifferently, if at all, west of Lake Michigan.

The Japan Quince (*Cydonia Japonica*) is similarly hardy, and is grown chiefly for its brilliant flowers, which appear very early in spring. There are several varieties, differing slightly in color ; some of which, when of mature age, fruit freely. The ripe fruit may be used like that of the common quince.

THE BLACK WALNUT.

The Black Walnut (*Juglans nigra*) is one of the largest of northern forest trees. Its limit northward is probably not much, if any, beyond latitude 44°, although it is being planted for timber and shelter even farther north. Reports from northern Wisconsin, Minnesota, and Dakota indicate that, in those regions, its permanent success must be regarded as problematical; dependent, possibly, upon a judicious selection of soil and aspect.

It is successful in southwestern Iowa; while in central Wisconsin it has been found to grow well for a few years and then fail. It is said to grow and fruit well in southern Minnesota, as well as in some portions of Dakota. It is found to be more satisfactory at the extreme north, when grown from northern seed, a fact that is believed to be true of plants generally.

The English walnut* (*Juglans regia*) is grown largely and with profit in some of the Pacific States, but fails at the East, and is too tender for the extreme North.

THE BUTTERNUT.

The Butternut (*Juglans cinerea*) has a somewhat more extended range northward than the black walnut. It is perfectly at home, if not actually indigenous, in Michigan up to latitude 45°, and is abundant as a forest tree in portions of southern Minnesota in that latitude. Although not supposed to be indigenous, it is successfully grown in portions of Iowa, and there seems good reason for the hope that it may be found successful as far north as the national boundary, possibly even farther.

THE HICKORY-NUT.

The genus *Carya* consists of several species, of which *Carya alba* is very widely distributed, and may be considered to be the Northern hickory-nut proper.

Carya sulcata, the Western shell-bark hickory, has a nut of large size, with a very hard, thick shell. It is indigenous from Pennsylvania to Illinois and Kentucky. In Michigan its extreme northern limit is reached in the third tier of counties in the lower peninsula.

Carya oliviformis, the Pecan, is said to be indigenous along the Mississippi River as far north as southern Iowa, which is believed to be its extreme limit northward.

Besides the foregoing, *Carya tomentosa*, the Mocker-Nut or white heart hickory; *Carya glabra*, the Pig-Nut or broom hickory, and *Carya amara*, the Bitter-Nut or swamp hickory, are indigenous and more or less common, although of little value save as useful timber. Their limit northward can not be said to be determined, save that Messrs. Wheeler and

* The proper name of this nut is *Madeira nut*, because it came originally from the island of Madeira, in Portugal, and is in no sense English.—H. E. VAN DEMAN.

Smith, in their Michigan Flora, remark that "No member of this family gets much north of latitude 43°."

In southern Minnesota, however, near the latitude of Saint Paul (45°), the hickory (*Carya alba*) and bitter-nut (*Carya amara*) are reported to be successful, probably as artificially planted trees.

THE CHESTNUT.

The American Chestnut (*Castanea vesca*) finds its northern limit in Michigan at about latitude 43°, although it is apparently hardy much farther north, probably throughout the lower and possibly in some portions of the upper peninsula.

West of Lake Michigan this tree is not known to exist as an indigenous growth, although when planted on suitable soils it proves hardy and successful.

Chinquapin (*Castanea pumila*) is a native of southern Pennsylvania and Ohio, and on south, and is only known farther north as an introduced curiosity.

The European or Spanish Chestnut (*Castanea vulgaris*) bears a much larger nut, though less sweet than the American. The tree is tender at the North and West, except in specially-favored localities.

The Japanese Chestnut is a comparatively recent introduction, apparently quite similar to the Spanish, although it is claimed to be an earlier bearer, with even larger fruit. It will no doubt prove tender, at least north of latitude 43°.

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U. S. DEPARTMENT OF AGRICULTURE. —
DIVISION OF POMOLOGY.
BULLETIN NO. 4.

REPORT

ON THE

RELATIVE MERIT OF VARIOUS STOCKS FOR THE ORANGE,

WITH NOTES ON

MAL DI GOMA AND THE MUTUAL INFLUENCE OF STOCK AND SCION.

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LETTER OF SUBMITTAL.

FEBRUARY 27, 1891.

SIR: I have the honor to submit herewith the following report upon the subject of stocks for orange trees. It has been prepared from reports received in answer to a circular sent to the orange growers of the United States, and the conclusions reached are based upon the testimony of a large number of those who are actively engaged in the cultivation of this fruit.

Respectfully,

H. E. VAN DEMAN,
Chief of Division of Pomology.

Hon. J. M. RUSK, *Secretary.*

INTRODUCTION.

For a number of years the question of the proper stock upon which to bud the orange has been actively discussed, but no decisive conclusions have heretofore been reached to aid an inexperienced planter in the selection of the stock upon which to found his grove. Recognizing the necessity of some guide to the subject, the Department of Agriculture, through the Division of Pomology, issued early in the current fiscal year a circular to the orange growers of Florida and Louisiana, asking for an opinion, based upon their individual experience, in regard to the merit of the several stocks in use, and particularly in regard to the sweet (*Citrus aurantium*) and sour (*C. bigaradia*) orange stocks. Numerous replies have been received, and upon them the conclusions and recommendations of the present paper are based. The author's personal views have been eliminated as carefully as possible. Circulars were not sent to California, as the introduction of the sour orange stock there is too recent to warrant a final judgment upon its value, but correspondence has been had with some of the growers in that State who have had experience in the matter.

Conclusions deduced from the reports of experienced cultivators will doubtless be considered of practical importance to those desiring to plant orange orchards, and may thus serve to lessen the cost of production of fruit, so that both grower and consumer may be benefited. The work of collating the information given in the circulars returned has been committed to and performed under my direction by Mr. William R. King, an assistant in this office. He has also added notes upon Mal di Goma and The Mutual Influence of Stock and Scion.

H. E. VAN DEMAN.

THE RELATIVE MERIT OF VARIOUS STOCKS UPON WHICH TO BUD ORANGES.

In general terms, the question of stock resolves itself into two parts: (1) The stock suitable for strong soil, and (2) that suitable for light, sandy soil. In regard to the first there is little room for doubt or debate; in every orange-growing section where the test has been made the verdict is decidedly in favor of the sour orange stock on strong, well-watered land, particularly that classed in Florida as "hummock."* This is quite natural, since these lands are the adopted home of the wild sour orange. The superior natural vigor of the wild tree under these conditions, its freedom from disease, especially the dreaded Mal di Goma (foot rot or gum disease), and the early age at which it bears paying crops when budded, all contribute to make it popular. The reports of our correspondents have been tabulated and the summary will be discussed in detail under the different topics.

SWEET STOCK.

Under ordinary conditions the sweet seedling has long been considered the longest lived and most thrifty of the orange family, but as the foundation of a commercial grove it is now seldom thought of by progressive growers. The same reasons that have been advanced in the argument for seedling orange groves were used years ago by the advocates of seedling apple and peach orchards, and are about equally forcible. The more recent plantings are based on a more progressive principle. Every one can remember when all oranges from Florida or California were simply "Florida oranges" or "California oranges;" now we hear Washington Navel, Majorca, Jaffa, Maltese Blood, and other varieties spoken of almost as freely by orange dealers as we hear Ben Davis, Yellow Newtown, Baldwin, and York Imperial referred to by apple consumers. The sweet seedling is long lived and in the course of

* For definition of the various types of Florida land see explanatory notes on page 21.

time will make a very large tree; it is thrifty and will do fairly well on dry, thin soil where the sour orange will not succeed. A budded tree, however, is in full bearing before the seedling has more than commenced to bear; it may not make so large a tree, but it is more prolific and a greater number may be planted on an acre, facilitating the gathering of the fruit, and allowing better care. As a stock upon which to bud some standard variety, the sweet seedling will always find more or less favor. Upon the high pine lands of Florida about 30 per cent. of the growers are found to favor sweet stock (including seedlings), against 40 per cent. who favor sour orange stock, this difference of opinion being traceable to different soil conditions or to the presence or otherwise of Mal di Goma. In general terms the sweet stock is most in favor upon the poorer class of high pine land, or with growers who are not able to give the trees proper attention and sufficient fertilizer. With them the sweet stock proves more hardy than the sour, enduring drought better and making a better growth under similar conditions. There is but one drawback to the general use of sweet stock on that class of land in north and central Florida, but that is very nearly fatal at present. The disease variously known as Mal di Goma, foot rot, sore shin, and gum disease invariably appears in every orange-growing district where sweet stock is used. Trees on high dry land are less liable to its attacks than those on stronger or damper lands, but no district depending on sweet stock can hope to be free from the disease for any considerable length of time. In the orange-growing districts of Europe it has compelled the almost total abandonment of the sweet stock, and in California, under the name "gum disease," it is beginning to cause alarm. In a number of localities in Florida this disease has not yet appeared to any extent, and from these the greater number of the replies favoring sweet stock come; but, on the other hand, there are many reports from growers who planted sweet stock trees, believing that their locality would be exempt, only to see them die soon after they reached a good bearing age. The subject of Mal di Goma will be discussed under a subsequent heading.

The question of sweet or sour stock is not so much one of relative vigor as of the grower's willingness to run the risk of Mal di Goma, and opinions vary according to soil conditions. Replies to inquiries on the subject indicate that sweet stock is favored by only about 17 per cent. of those who grow the fruit on flat woods or poorly drained high pine land, and by only about 3 per cent. of those whose trees are on hammock or other rich, damp land. This shows that sweet stock is not favored by the majority of growers.

SOUR STOCK.

The origin of the various species and subspecies of *citrus* is very difficult to determine, but Gallesio proves beyond doubt that the sour orange (*Citrus bigaradia*) was cultivated in Europe about the middle of the fifteenth century, long before the sweet orange was known there.

At that time, and indeed for nearly two centuries, it was popularly supposed that the sweet orange could be propagated only by grafting, and for this purpose the bigarade stock was almost universally used. It was quite natural, therefore, that the Spaniards at the time of their first settlement of Florida should have introduced the sour orange into that country. Perhaps no plant has ever been naturalized so rapidly and successfully as the orange tree. Indeed, did not the original narratives of the Spanish discoverers of these regions and the testimony of contemporary historians prove that this treasure was received from Europe, it would surely be regarded as indigenous to American soil.

In Florida the sour orange is found wild only in the hummocks. There it seems to delight in the rich, moist soil, and it is on this kind of land that its value as a stock is most apparent. While it does well on the better class of high pine land, especially when well cared for, it is never so vigorous as on stronger land. Its great point of value is its freedom from disease, and it is upon this one claim that its popularity is generally founded. Upon high pine land in Florida about 40 per cent. of the growers are found to favor sour orange stock against 30 per cent. who favor sweet, and 30 per cent. who are divided in their choice between rough lemon, pomelo, bitter sweet, lime, or who have no choice. On the flat woods near 70 per cent. favor sour orange stock against 17 per cent. who favor sweet, while on the hummocks fully 90 per cent. of the replies have been favorable to sour orange stock against 3 per cent. for sweet stock, including seedlings. Of the famous Indian River groves fully 99 per cent. are founded on sour stock.

In some localities in Florida, notably in Orange and Volusia Counties, it is claimed that drought is less injurious to sour than to sweet stock, and there may be some foundation for this opinion, owing to the relatively slower growth of the sour stock on sandy land, but the claim is not general. Its claim for superior resistance to frost is much more widespread, and despite some contradictory evidence, which may perhaps be due to local causes, we must accept it until more accurate comparative experiments are made. The California returns are decidedly corroborative of this claim.

In the nursery the sour seedlings are apt to become infested with leaf-scab to a considerable extent, which often causes serious loss. No critical study of the disease has yet been made, but it is clearly fungous in its origin, and until such study can be made it might be well to experiment with the ammoniacal fungicides which have proved so efficacious in pear leaf blight and apple scab. Once budded, all danger is over, the sweet top being quite proof against the disease. Lemon leaves and fruit are, however, subject to it.

Upon the subject of sour orange stock Mr. M. E. Gillett, of South Lake Weir, Florida, writes the Pomologist as follows:

This subject is one of vital importance to orange growers. All European countries years ago discarded the sweet root as a stock to bud or graft, and use the sour almost exclusively. I have been in the nursery business for some years, and have grown

many thousands of trees, have also charge of large grove interests here. One grove on heavy hummock land is about gone with gum disease. Out of 1,200 to 1,500 trees we have lost at least one-half, but have replanted all with others on sour roots, many of which are 5 years old and bearing, and show no sign of any foot rot. Another grove near here has lost every sweet stock (almost 600). All were replanted with sour stock 6 years ago, and are doing well. On a high pine grove, 80 feet above Lake Weir, we have lost several large sweet seedlings from same cause, though we have a remedy* which checks it on high land. On the low, heavy land, attacked trees always die. We have been shipping about 150,000 trees per year for the past 3 years to California, and from our experience we have contended all along that the sour stock was in many particulars the better stock. I learn that they have foot rot in California quite bad in some places, but in the face of it all there are a number of California nurserymen who have trees on sweet stock who will argue against the sour orange root. My experience with the two has been large, and the sweet seed is easier to get and cheaper, but for many reasons we always get the sour. We believe they are longer lived, hardier, more thrifty, and will stand more exposure than the sweet. In the Speer grove at Sanford the old seedlings are dying apparently from old age, while sour stock planted at the same time are beautiful old trees. I never knew a case of gum disease on a sour tree in the wild groves or on those that were transplanted, though sometimes when a tree is bruised it will gum, especially in hot weather, but it soon heals.

ROUGH LEMON STOCK.

Within the past few years a new stock, combining most of the good points of the sweet and sour stocks, has come into prominence, especially on the flat woods and scrub lands of the southern citrus belt of Florida. This is the "French" or "Florida Rough" lemon, which has been grown from time immemorial in Florida and the West Indies, and seems to correspond almost exactly in tree, flower, and fruit with Hybrid XXV (citroned orange, *citrus aurantium indicum*, *citratum fructu magno*, *cortice auro*, *crasso*, *amaricante*, *medulla acid et arma*) of Gallesio; it is also closely related to the Pomo d'Adamo citron, and partakes of the nature of the citron, lemon, and orange. The tree has escaped from cultivation and become naturalized in some parts of south Florida, where the hummocks contain numbers of bearing trees growing luxuriantly in the midst of thick underbrush and forest trees. It is very valuable for home use, though not for shipping; the fruit hangs on the tree in fair condition until the new crop is large enough to use, and is very healthful and refreshing in the raw state.

As a stock for the orange and lemon it is becoming favorably known all through south and central Florida, although in the northern part of the State the pomelo may prove a trifle hardier. Either stock should be budded as near the collar as possible as a safeguard against frost. Upon its value Reasoner (Pom. Bul. No. 1, p. 76) remarks:

The rough lemon is most desirable on poor land or on low and wet land, as it succeeds better than any other stock in such locations, being a free, rampant grower, not particular as to location.

* To be found under head of "Mal di Goma."

This statement, in fact, summarizes the whole subject. The rough lemon does not take the natural place of the sour orange stock for hummock or other strong soils, but it is practically as free from Mal di Goma, and is considerably more thrifty than sweet stock upon high pine land, at the same time doing well on wet flat woods, underlaid with hardpan. Its practical value upon sandy soil is indicated by the fact that 45 per cent. of the growers in south Florida favor it for high pine, 50 per cent. for flat woods, and 8 per cent. for hummock. On hummock the sour orange stock holds its own, 84 per cent. of the replies favoring it for that class of land.

POMELO STOCK.

In habit of growth and thriftiness the pomelo much resembles the rough lemon and practical trial has proved it a good substitute for sweet stock on high pine land in the northern citrus belt of Florida. It is more vigorous in growth than the sweet seedling on this class of land, and while it does not gain favor on flat woods or hummock, yet it is reputed to be considerably more hardy than the rough lemon, and may possess all the advantages of that stock on dry, sandy land. Among the reports furnished this office not over 3 per cent. of the writers have a large number of trees on this stock, but a much larger proportion pronounce in its favor.

OTHER STOCKS.

Several other species of *Citrus* have been used as stocks for the orange, among which may be named the lemon, lime, China lemon, bitter sweet, citron, and trifoliata. The sweet lime, especially, is much esteemed as a stock in India, and the Florida lime stock promises to extend the southern limit of profitable orange culture. None of them, however, are of great practical importance for grove culture in the United States. The lemon is too susceptible to gum disease, the lime and citron lack resistance to cold, the China lemon, commonly propagated from cuttings, soon loses thrift and dies, the bitter sweet is not so thrifty as the sour orange, and the trifoliata is a hardy dwarf stock for indoor use, or for dwarfing the Satsuma. Upon this stock the Satsuma is hardy as a garden tree beyond the usual limits of orange culture, but its value has been greatly exaggerated, especially in Texas, where it has been advertised as able to stand a zero temperature. A Satsuma, Kumquat, Mandarin, or Tangierine on trifoliata stock makes a compact and highly ornamental house plant which bears good crops in 3 or 4 years from the time of budding.

ORANGE STOCKS IN FLORIDA.

Per cent. of growers favoring each kind of stock on high pine, flat-woods, and hummock land, by districts:

Kind of stock.	Northern citrus district.			Central citrus district.			Southern citrus district.		
	High pine land.	Flat woods.	Hummock.	High pine land.	Flat wood.	Hummock.	High pine land.	Flat woods.	Hummock.
Sweet orange*	P. ct. 33	P. ct. 18	P. ct. 3	P. ct. 35	P. ct. 30	P. ct. 1	P. ct. 23	P. ct. 9	P. ct. 6
Sour orange	53	77	97	34	64	90	29	40	64
Rough lemon	2	—	—	11	—	4	45	50	8
Pomelo	2	—	—	3	—	1	1	—	—
Bitter sweet	1	—	—	—	—	—	—	—	—
No choice of stocks	11	10	—	17	6	4	2	1	2

* Sweet orange stock includes sweet seedlings.

SUMMARY AND RECOMMENDATIONS.

FLORIDA.

Northern citrus belt.—Upon high pine land, particularly of the second or third class, use pomelo or rough lemon stock, taking care to bud very low—as near as possible to the collar. The pomelo is decidedly the most hardy, comparing favorably with the sweet orange in this respect. If the grower is prepared to cultivate highly and perhaps irrigate, sour orange stock will be as satisfactory as any. Sweet stock should be used only after carefully weighing the risk from Mal di Goma; it will make large trees in less time than the sour, but not so quickly as rough lemon or pomelo, and will not bear so early or be so prolific. In planting sweet stock an excellent plan is to set it high, so that the crown roots may be more or less exposed to the light and air, thereby lessening the danger of disease.

For flat woods, especially when decidedly wet and underlaid with hardpan, the sour root is decidedly better than the sweet, and although both rough lemon and pomelo are more thrifty, their comparative tenderness renders them undesirable except where the benefit derived from thrifty growth is marked.

Upon hummock land sour stock is beyond all question to be preferred. Indeed, on such land no other should be planted.

Central citrus belt.—In this section the rough lemon root can be used with much more safety, but should be budded low, both as a safeguard against frost and in order to shade the trunk from the sun. Sour stock is not in so much favor as in the more northern counties, especially upon high pine land and flat woods. Upon hummock in this section the sour orange root is far superior to any other for a stock.

Southern citrus belt.—Upon high pine land, scrub, and flat woods use the rough lemon stock. In the South the superiority of this stock is

beyond question, and it does fully as well upon flat woods as upon drier land. Even in the hummocks it is superior to sweet orange, although the sour orange is much more satisfactory in the end, on that class of land, anywhere in the orange-growing regions.

LOUISIANA.

Upon the rich alluviums of the Lower Mississippi and its delta, where all the large orange groves of Louisiana are situated, the sour orange stock is preferred by about 90 per cent. of the planters. In a few instances sweet seedlings have been used on the higher, gravelly lands with fair results, but the sweet stock as such is almost unknown, while danger from frost precludes the use of pomelo or rough lemon stock. Mal di Goma is a common disease among the sweet seedlings, under the name "sore shin."

The greater part of this orange region is liable to inundation for a month or more in the spring, as the river is above the level of the land and frequent crevasses occur. Nothing but the sour orange root can safely be used in locations subject to overflow.

CALIFORNIA.

The orange has held a leading place among the fruits of California ever since American occupation, but the question of stock has not been considered to be of particular importance. Within the past few years, however, the introduction and remarkable success of the wild sour orange stock (*C. bigaradia*) of Florida has opened up a discussion which will result in lasting benefit to the State. Certain nurserymen who have large interests in sweet stock at stake bitterly oppose the introduction of the sour orange, and endeavor to bias public opinion by making the term sour stock include all roots except that of the sweet orange, thus seeking to make the condemnation which all California growers award to the lemon, China lemon, lime, etc., as stocks cover also the sour orange stock. The injustice of this is manifest and can but work injury to those employing such means.

The deep, rich alluvium, formed from granite and limestone and underlaid with a retentive subsoil and sufficient surface irrigation, form a combination of conditions to which the sour orange is peculiarly well suited.

From data sent this office by California orange growers who have tried the sweet and sour orange stocks side by side on a large scale it is safe to conclude :

1. That the sour stock trees make a more thrifty growth ;
2. That they are more free from disease and are entirely resistant to Mal di Goma (foot rot or gum disease) ;
3. That they are less liable to be injured by cold while young ;
4. That the quality of the fruit is not impaired.

It seems high time for the California nurserymen to import sour orange seed and grow their own sour stock, which would then be much more satisfactory than the sour seedlings now brought from Florida by the carload.

The great value of the Florida rough lemon as a stock in Florida has led to some inquiry as to its probable value in California. No extended experience has been had with it in the latter State, and no positive opinion can be given, but its remarkable thriftiness and precocity of bearing make it worthy of full trial. It is considerably more sensitive to frost than the sweet orange, and should invariably be budded low. If it proves desirable in other respects it may be safely used wherever the lemon succeeds commercially. It is entirely free from *Mal di Goma* in Florida.

As an indication of the present status of the sweet and sour orange stocks in California, extracts from the reports of several representative growers are appended :

My ranch is on the northern border of the valley of San Bernardino, near its eastern extremity. It is in the valley proper, and at the base of the foothills by which it is bounded on the north and east, and has an altitude of 1,250 feet. The location is such that the cold air comes down from the San Bernardino mountains at night, displacing the warm accumulations of the day, which rise to the foothills, assuring them safety from frost during the night. This is at the expense of the lowlands, which suffer from the extreme changes of temperature. The soil is a rich, sandy loam, well irrigated. Manifestly, the abrupt changes in temperature to which I have alluded, while perhaps not sufficient to kill the tree, are not for its good, and if there is any difference in the sweet and sour stocks in ability to withstand these changes, it will be found in the superior vigor and vitality of the one over the other.

Early in 1886, I procured from relatives at St. Mary's, Ga, 40,000 reliable sour orange seed, which I planted and subsequently budded to Washington Navel. In May, 1890, I transplanted about 1,100 in orchard form. In 1888, on my ranch, four-year old buds on sweet stock were frozen to the collar. Within the past few days the 1,100 trees spoken of have been subjected to the lowest temperature I have ever known on my farm, and in no instance have they suffered. Fresh growth is nipped in cases only. The registers were for January 10, 6:30 a. m., 24° above zero; for 11th, 23°; and for 13th, 21°. Within 10 feet of one row of these trees, ice formed one-half inch thick.

I have never seen anything in sweet stock comparable with the wealth of roots on my sour stock. The tops have grown even more luxuriantly. By reason of this and my experience of the low temperature of the past few days, I am pleased to have this opportunity to testify as to the performance of the sour stock and to venture the opinion, based upon the experience in 1888, that the sweet stock trees would not have survived.

Permit me to refer to the prejudice which exists here, fostered by our local nurserymen, against sour orange stock, and to recommend the procuring and planting of the seed in all cases. * * * Whole orchards have been lost by planting Florida grown trees which were poorly packed, and frequently kept out of the ground for months. — H. J. QUINAN, Messina.

I have planted during the last 3 years about 90 acres of orange and lemon trees, of which about 75 acres were on sour stock (Florida wild orange), budded to several varieties, the remaining 15 acres being sweet seedlings. * * * These trees have done well, making excellent growth and keeping in healthy, vigorous condition. They have been subjected at various times to several degrees of frost, 26° once or

twice, 28° probably several times, and many nights cold enough to form ice on standing water, and without any serious wilting or apparent injury. The sweet seedlings have made a larger growth than any of the budded trees planted at the same time (1888) except the lemons, budded on sour orange stock, which have grown very heartily indeed and are now bearing. * * * In my old orchard of Tahiti seedlings there are perhaps sixty trees of Mediterranean Sweet on sweet stock, averaging 10 years old. They grow heartily and bear well, but show more sensitiveness to frost than my young trees, many of the leaves wilting and turning white after a cold night.

One thing more may be worth mentioning as bearing on the question which has been raised as to whether the sour root could impair the flavor of the fruit of budded trees. On my Washington Navels, planted in 1888, I had in February and March, 1890, perhaps two boxes of perfect fruit. The flavor of these oranges was very superior; they were sweet, and of very lively flavor, and certainly showed no bad effect from the stock. I had made a similar observation in Riverside 2 years before, on eating oranges grown on sour stock in the orchard of Mr. Bliss. They were the best Navels I found in Riverside at that time, being a little riper, owing to some earlier or heartier habit of the stock.—E. S. THATCHER, Nordhoff.

My investigations commenced in 1885 and have been faithfully followed up to date. Previous to 1885 all the orange trees in California were on sweet stock, the sour orange stock being unknown, hence a sweeping interest lies in sweet stock. My own orchard was on sweet stock, but wherever I have lost trees I have set sour stock. Among my oldest trees I have been fighting "gum disease" for 5 years. In some cases I have succeeded in overcoming it by cutting away the diseased wood and bark and painting with strictly pure "rubber paint" to exclude the air. I have always irrigated in furrows, allowing no water near the trunk of the tree, and have kept the ground loose by cultivation. I can see no reason for "gum disease" except that it is characteristic of the sweet stock; have never heard of a case on sour orange stock. To-day I feel warranted in saying that were I putting out a new orchard, I would unquestionably use orange and lemon on sour orange stock.—D. C. TWOGOOD, Riverside.

Of the 70 acres I have planted only 10 acres with trees on sweet stock. When I made the change to sour stock, I made it mostly on the ground that I could get better rooted trees at a less price on the Florida sour stock than on home-grown sweet stock. I have now found that my trees on sour stock have made a better growth than trees budded on sweet stock.

Three years ago next spring I planted 10 acres of Washington Navels on sour stock. I was unable to get good sized trees for planting and was obliged to take trees from 2 feet to 30 inches high. On these trees there is about a box of oranges. In flavor, sweetness, and in all points that count to make a first-class orange, they are equal to the best fruit ever grown. Have had no trouble from "gum disease" up to date on either stock.—C. E. HARWOOD, Ontario.

Mr. J. E. Cutter, of Riverside, also gives the following interesting statement:

Amount of land, 10-acre lot; soil, red granitic mesa; depth to surface water, about 150 feet; date of planting, April-May, 1887; stocks used, Bigaradia (sour orange); size of stocks used, one-half to five-eighths inch diameter at base. [These small stocks had just been brought from Florida.] Date of budding, October, 1889. [Some rebudding in April, 1890.] Average diameter at base when budded, 2 inches; average diameter at point of inserting bud, 1½ inches; average height of point of inserting bud, 2 feet 8½ inches; average height of trees, December 25, 1890, 10 feet 8½ inches; average growth of buds, season of 1890, 8 feet three-tenths inch; maximum growth of single bud, 12 feet 1 inch.

This is by actual measurement, and Mr. Cutter further states that the condition of his trees is the "best of any grove I have ever seen."

MAL DI GOMA.

Foot rot, gum disease, sore shin, etc.

A number of years ago a mysterious disease of the orange made its appearance in Florida, and subsequently in Louisiana and California, which has since baffled, to a considerable degree, all efforts to learn its exact nature or to effect a permanent cure. Investigation developed the fact that the same disease had long been known as Mal di Goma in southern Europe, where it caused the loss of millions of dollars' worth of orange and lemon groves, and that it first appeared in the Azores about fifty years ago, and upon the Continent of Europe ten years later.

CHARACTERISTICS OF THE DISEASE.*

The disease, as a rule, is first made manifest by the appearance of a gummy effusion which appears, principally in the spring and autumn, on the trunk of the tree close to the ground, or directly upon the root. Even before there are any outward signs of diminished health, small drops of gum appear on the bark of the trunk; these increase in size and number and the bark appears to melt away or become honeycombed; finally, the gum liquefies and assumes a muddy brownish color and a disagreeable odor. In winter or summer when the effusion of gum decreases or stops the greater part of the bark around the point of infection dies and becomes detached from the wood. When dry it springs away from the wood and becomes hard and brittle. The surface of the wood underneath the bark is also affected to some little distance in all directions from the point of infection. The most vital part of the trunk, the cambium layer, which lies between the bark and the wood, is partially destroyed, and each year this destruction extends until it finally girdles the tree completely, thus cutting off all communication of the vital fluids between the root and the top, and causing the death of the tree.

When the disease attacks the roots the death of the tree follows more rapidly—often in less than a year. The sudden changing of the leaves to a sickly yellow color is the first visible symptom of the disease when the roots are attacked. It must be kept in mind, however, that the leaf-yellowing may be due to other causes.

CAUSE OF THE DISEASE.

The cause of Mal di Goma is not certainly known at present, but, contrary to the general supposition, indications point to a bacterial rather than a fungous origin. It is true that several species of fungi are found on the diseased parts, but these are believed to be saprophytic in their nature rather than parasitic.

Various theories as to the cause of the disease have been advanced—improper drainage, "wet feet," growing over hardpan, improper fer-

* Extract from Bulletin No. 8, Division of Vegetable Pathology.

tilizer, unsuitable soil, irrigating too close to the tree trunk, excess of ammonia, setting too low, etc.—but none of them hold good except in individual instances.

TREATMENT SUGGESTED.

The disease is a dangerous one to experiment with, and except in unusually well drained location the tree had better be immediately dug up and burned, root and branch. It is even dangerous to dig about healthy trees with the same implements used to dig about diseased trees unless they are disinfected with carbolic acid. Positive evidence exists that the disease has been conveyed from tree to tree in this way, by a sort of accidental inoculation. As an aid in preventing or checking the ravages of the disease, growers are advised (1) to bud on resistant stocks—wild sour orange, rough lemon or pomelo; (2) to plant on dry and porous soil if sweet stock is used; (3) to irrigate sparingly and keep the water from the trunk of the tree; (4) to cut out every trace of diseased wood and bark when the malady appears, and burn the part cut out.

Secretary B. M. Lelong, of the California State Board of Horticulture, recommends that the wound be painted over with pure rubber paint, after the diseased wood has been removed. Mr. M. E. Gillett, of Florida, gives the following receipt for a treatment which he has found reasonably effective upon high pine land :

The remedy I have used is composed of the following ingredients: One peck fresh stone lime, 4 pounds copperas, 5 pounds sulphur, 1 gill crude carbolic acid. Put these in a barrel and add enough water to slack the lime, cover and let it stand until cool, then fill the barrel with water and stir well. The mixture is then ready for use. All the diseased bark and wood should be carefully cut away, and the wash applied with a brush. While the preparation does not always cure, it has checked the trouble, and trees that I have experimented upon seem to be doing well.

This, and other remedies we have seen, seem to be disinfectants rather than fungicides, but the addition of sulphate of copper may be an improvement, and is certainly a step in the right direction. Washes having bisulphate of soda and carbonate of lime as a base would probably be of some value, and are worth experimenting with.

MUTUAL INFLUENCE OF STOCK AND SCION.

While the prime object of grafting or budding is to perpetuate the characteristics of an individual plant, or to propagate a variety, physiologists tell us that the vigor and fertility of the scion are affected more or less by the operation. The pear grafted on quince roots is dwarfed, but on Kieffer pear roots is made much more vigorous. On the principle that the vigorous growth of the tree is at the expense of its fruitfulness, and on the other hand that prolificacy interferes with vigorous growth, working a strong growing scion upon a weak root will bring the tree into bearing at an early age. But why the stock should hasten or retard

the period of ripening, or how it changes the color, flavor, or size of the fruit, is not so easily shown. We know that a number of the superb foreign varieties of the pear can only be grown successfully by us on quince roots; the Angouleme and Louise Bonne are notable examples of this, being generally conceded to be of decidedly higher quality upon the quince, but on the other hand the Seckel needs all the vitality of a thrifty stock to reach its greatest perfection.

All we know about the phenomenon of dwarfing is that the quince stock gives out a more meager supply of sap, so affecting the growth of the tree that it is stunted in its growth of wood and thus brought into bearing at an earlier age and made to produce larger and more certain crops of perfect fruit, but the want of complete harmony between stock and scion has a tendency to shorten the life of the tree. A good example of the ordinary effect of stock upon scion may be found in nursery practice: a promiscuous lot of seedlings is raised and upon these roots some particular variety is worked; all may be planted at the same time and under exactly similar conditions, but a season's growth will develop a marked variation in individual vigor, which can hardly be laid to any cause except variation in the vigor of the different seedlings. Indeed, this difference in thriftiness, owing to variation of stock, is a matter of commercial importance, determining to a large extent the several grades into which nursery trees of any given variety are assorted.

Considered from a theoretical point of view no influence, as far as the flavor of the fruit is concerned, is to be expected. The ascending sap, which is furnished by the root or stock, is nearly a simple fluid. The leaves digest and modify this sap, taking carbonic acid from the air and forming the sugar compounds and sap proper. The leaves of a grafted tree are the leaves of the particular variety cultivated, and have no physiological connection with the root grafted upon. Every bud, leaf, and fruit upon a branch maintains its individuality by preparing its own proper nourishment out of the general supply of the sap. Each separate cell of the inner bark has this power of preparing food according to its nature. In proof of this De Candolle (*Physiologie Végétale*) cites an instance where rings of bark, of closely allied species, were grafted one above another on the same tree; no buds were allowed to grow, but when the tree was cut for examination, characteristic wood of each species was found deposited under its respective ring.

Though the stock increases in size by woody matter derived from the sap elaborated by the leaves, its character is not perceptibly changed; a sprout from below the point of union always being characteristic of the original stock. Proof that the graft may communicate disease to the stock is, however, abundant and beyond question. Yellows of the peach has been propagated thousands of times by budding, and the stock and bud die together from its effects. The same may also be

said of blight in the pear. The phenomenon of variegation, which is now classed as a form of disease, gives an excellent example of the power of the scion to infect the stock, variegated leaves frequently appearing upon the stock below the point of union and sometimes even as stolons from the root. On this point Burbidge (*The Propagation and Improvement of Cultivated Plants*, p. 61) gives some very interesting details. In some instances the *habit* of root growth is influenced to a marked degree, an upright top inducing deep rooting, and a spreading top being always accompanied by good lateral roots.

A strong root produces a strong top growth, and while the top remains and expands the root extends in the same ratio. When, however, we cut off the vigorous top and substitute a weaker, the root is, to a great extent, paralyzed, even though it induces a strong temporary growth. It can never do more than respond to the weaker growth grafted upon it, and in the end the graft becomes just as weak as if it had been upon its own roots. In this relation, however, recent experiments incline us to the belief that far greater benefit may result to a weak scion if a portion of the original vigorous stem and foliage be allowed to remain, thus preserving nearly the whole vigor of the root. In a limited way a weak variety might advantageously be grafted with stronger ones at both ends by the practice known as double grafting.

To summarize our present knowledge of the whole subject we may say that a strong growing variety is dwarfed by union with a weaker stock, while a weak scion is not *in the end* benefited by grafting in the ordinary manner upon a stronger stock. In either event the flavor and quality of the fruit is only affected in proportion to the thriftiness of the tree's growth, the natural flavor or character of the fruit of the stock having no influence whatever upon the fruit of the scion.

EXPLANATORY NOTE.

For the benefit of those who are not familiar with Florida, the terms "high pine land," "flat woods," "scrub," and "hummock" may be explained as follows:

High pine land.—A light-gray sandy loam, more or less rolling in surface, timbered sparsely with long-leaf pine and fairly free from undergrowth, except in localities where saw palmetto is abundant; generally underlaid with clay at a depth varying with the height of the land, and with a yellow sand subsoil. On the lower lands several species of scrub oak are found among the pines.

Flat woods.—Timbered like high pine, but generally has more saw palmetto; underlaid with hard-pan at a depth of 6 inches to 2 feet, and in the rainy season often flooded for weeks at a time.

Scrub.—Generally a bank of white or yellow sand, covered with a scant growth of a species of heath known as rosemary and thickets of scrub or spruce pine (*Pinus inops*), a species which grows on no other land. "Black-jack" scrub is generally not quite so barren as rosemary scrub.

Hummock.—A term applied indiscriminately to any land with hard-wood timber and dense undergrowth. The soil is generally much stronger than the best pine land, and lies on a lower level, although not always wet. Low hummock is often very close to the water level, but can not be called swampy, although frequently flooded in summer.

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U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF POMOLOGY.

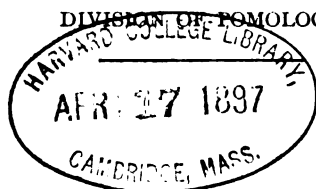


FIG CULTURE.

EDIBLE FIGS: THEIR CULTURE AND CURING.

By **GUSTAV EISEN,**

Curator in Biology, California Academy of Sciences,
San Francisco, Cal.

FIG CULTURE IN THE GULF STATES.

By **FRANK S. EARLE,**

Horticulturist, Alabama Experiment Station, Auburn, Ala.



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,
Washington, D. C., January 30, 1897.

SIR: I have the honor to transmit herewith, and to recommend for publication as a bulletin of this division, articles on "Edible figs: their culture and curing," by Dr. Gustav Eisen, of San Francisco, Cal., and "Fig culture in the Gulf States," by Frank S. Earle, of Auburn, Ala.

The climatic conditions of the sections of the United States in which figs can be successfully grown are so widely different that it has been deemed advisable to publish these papers as one bulletin, in order that a comprehensive presentation of the subject may be within reach of those interested in this industry.

S. B. HEIGES, *Pomologist.*

Hon. J. STERLING MORTON,
Secretary of Agriculture.

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FIG CULTURE.

EDIBLE FIGS: THEIR CULTURE AND CURING.

By GUSTAV EISEN.

The edible figs cultivated in the United States both for eating fresh and for drying all belong to one species, *Ficus carica*. Of this species there are now described about 400 varieties which are sufficiently distinct to be considered by the student and the practical horticulturist. The intending planter should study the character of the varieties more closely than has hitherto been customary in this country, though his safest plan is, of course, to plant in quantity only such varieties as have proved valuable in his own locality, or where soil and climate are similar.

NATURE AND STRUCTURE OF THE FLOWERS AND FRUIT OF THE FIG.

Before we consider these different varieties, a few remarks on the nature and structure of the fruit are necessary. The fig which we eat is really a receptacle, on the surface of which are situated the numerous flowers. But as this surface is concave, or curved inwardly, like the hollow of a closed hand, the flowers can not be seen except when the fig is cut. Then it becomes apparent that the chamber formed by the curved receptacle communicates with the outside by means of the "eye" at its apex. In some varieties the "eye" is almost closed, opening only when the fig has reached a certain age; in others it is so large that a pea could easily pass through. The flowers are always more or less fleshy, are generally imperfect, and do not much resemble the bright flowers of other fruit trees and plants in our gardens. There are four distinct kinds of fig flowers, but these are not always found in a single fig, in fact they are rarely all found together. They are designated as follows:

Male flowers.—These possess four pollen-producing stamens. They are found only in the wild or "caprifig," the ancestor of our cultivated figs, and in a very few varieties of edible figs.

Female flowers.—These possess a single style, stigma, and ovary, and when fertilized, produce seeds. Owing to the absence of male flowers, or the failure of the male and female flowers in the same fig to mature at the same time, they rarely produce fertile seeds unless fertilized by pollen carried by insects.

Gall flowers.—These are degenerate female flowers which do not produce seeds, the abortive ovary serving only for the habitation and breeding place of a very small wasp, the *Blastophaga*, which is used in caprification. The gall flowers are found only in the original wild fig.

Mule flowers.—These are imperfect female flowers, incapable of producing seeds or of affording a breeding place for the wasp. These flowers are found to the exclusion of all others in most of our cultivated figs.

Because of these differences in the flowers the numerous varieties of edible figs may be divided into tribes or subspecies. These are as follows:

CLASSIFICATION OF VARIETIES OF EDIBLE FIGS.

Cuprifigs (goat figs or wild figs).—These figs grow wild in southern Europe, northern Africa, and western Asia, and have been recently introduced into California. They bear all the kinds of flowers except the *mule* flowers, and as they are the only figs bearing *male* flowers they are essential in all fig districts where mature and fertile seeds are of importance, or in other words, where caprification is necessary.

Smyrna figs.—These are grown only in the Smyrna district of Asia Minor. They have only female flowers, and neither these latter nor the receptacle on which they grow will come to any maturity without caprification or pollination. So-called Smyrna figs, which have been bought of nurserymen, have generally proved spurious, as, unlike the true Smyrna figs, they mature their fruit without pollination. Of late years true Smyrna figs have been planted in California, but they have failed to ripen fruit except when artificially pollinated. These will not produce ripe fruit in commercial quantities until caprification can be practiced, and neither these nor the caprifig should be planted at the present time, except for experimental purposes.

Common edible figs.—These are the common varieties of our orchards, which bear fruit and mature it with regularity without pollination or caprification. They bear two crops a year, the “early figs” or “brebas,” and the later or “summer figs.” Of this tribe alone there are some 400 varieties described more or less perfectly, and probably as many more undescribed and unknown.

San Pedro figs.—This tribe contains only a few dozen varieties, some of which are cultivated in California, and also in Florida and other Southern States. They are characterized by maturing only the first crop or “brebas.” The second crop always drops before reaching maturity. The cause of this is that the first crop contains only “mule flowers,” like those of the common figs, while the second contains only “female flowers,” like those of the Smyrna figs.

The San Pedro tribe of fig varieties is specially valuable on account of the large size and early maturity of the “brebas” or first crop. They should, therefore, be planted only in places where it is desirable to grow large, early figs, for marketing fresh. They do not succeed everywhere, as they require a warm and early spring climate.

In tropical countries there are numerous varieties of other species of figs growing wild. Many of them are edible, but all are less palatable than our edible fig, and with the exception of the Sycomore fig, *Ficus sycomorus*, of Africa, are of no economic importance except as food for animals.

For this purpose, however, they are very useful, and the Sycomore fig should be introduced into the Southern States, where it would probably thrive in frost-free localities.

VARIETIES OF FIGS FOUND USEFUL IN CALIFORNIA.

The existing confusion regarding the names of the varieties of the fig is largely due to incomplete descriptions. The following points are of importance in every fig description, and should always be noted: Size, form, neck, stalk, ribs, eye, color of skin, color of pulp, seeds, quality, growth, and leaf. In order to simplify descriptions, these points should always be mentioned in the same order. It is also of great importance to note whether the first crop alone matures fruit, and whether the two crops differ materially in any of the above-mentioned points.

Of the 400 or more described varieties of figs, comparatively few have been tested in the United States. Most of those tested are French or hot-house varieties, very few southern or Mediterranean figs having been introduced, though many of the latter are worthy of testing in this country.

A few of the varieties that have been found most useful in California are described:

ADRIATIC.—Size medium, roundish; neck medium, stalk short; ribs obscure; eye open, with red iris; skin very thin, greenish in the shade, yellowish in the sun; pulp bright strawberry red or with violet streaks in the meat; varies in quality according to location.

This has been found very useful in California, but is not of fine flavor when dried. It requires rich soil, with considerable moisture and a very large percentage of lime. This variety is *not* identical with that known in Italy as Adriatic.

ANGELIQUE (syn. *Angelica*).—Medium, pyriform; ribs prominent, yellowish white; pulp white with rose-colored center; leaves five-lobed. A very good variety in some of the coast valleys.

ATHENES (syn. *Marseillaise*).—Small, roundish or turbinate, with indistinct ribs, depressed at apex, skin rough; color whitish yellow, pulp red, opaline; very sweet and one of the best drying figs both in France and California.

BOURJASSOTTE, BLACK (syn. *Barnissotte, Black*).—Medium, broader than long, flattened at apex, with no neck and an uneven cheek; ribs distinct, even; eye small, sunk, closed; skin waxy, black with violet blush; bloom clear blue, wanting at apex; meat pink, pulp blood-red. A most excellent fig for table. It requires rich, moist soil.

BOURJASSOTTE, WHITE (syn. *Barnissotte, White*).—A fig related to the former, but larger; eye large, sunk; skin waxy, green; pulp bright red. A very fine fig. Tree very large.

BROWN TURKEY.—Large, turbinate, pyriform, with hardly distinct neck; stalk short; apex flattened; ribs few, slightly elevated; eye medium, slightly open, scales large; skin smooth, greenish to violet-brown in sun, with darker ribs; pulp dark, rosy red, quality good, and tree a good bearer. Brunswick is frequently confounded with this fig.

BRUNSWICK.—Very large, pyriform, with swollen cheeks, one of which is larger than the other; apex very obtuse; neck and stalk very short; ribs distinct, but not much elevated; eye medium, open; skin pale amber with violet tint; pulp amber. An early, large fig, but with no flavor. Very common; requires rich, moist soil.

CELESTE, BLUE (syn. *Violette*).—Small, ovate, turbinate; ribs few, but distinct, especially near apex; eye raised, rough; color dark, violet amber, without reddish blush; bloom confined to the neck; skin thin; pulp deep rose; meat amber; sweet, but lacking in flavor.

DOTTATO.—Medium ovate, pyriform; neck well set; stalk very short or none; ribs low; skin smooth; eye medium; skin thin, yellowish green; meat white; pulp yellowish amber, sometimes with violet flush. One of the best figs for drying; tree a strong grower, requiring moist, rich soil. Lately introduced into California.

DRAP D'OR.—Large, pyriform, with very low neck and stalk; ribs elevated; apex obtuse and concave; color light, violet, reddish amber, not dark; pulp rosy red. A fig of very fine quality, especially useful for confections and crystallizing; not identical with Brunswick.

DU ROI.—Above medium; round, pyriform; stalk very short; eye large or variable, with scales standing out; skin smooth, pale bluish green; pulp amber, with rosy streaks and exceedingly minute seeds. Related to Marseillaise and Athenes, and one of the very best figs in California for drying.

EARLY VIOLET.—Small to very small, round, turbinate; neck distinct but short; stalk medium to long; ribs distinct, elevated, skin rough; violet-brown, with thin, pearl-colored bloom; pulp red. This variety bears almost continuously and is preferable to the Ischias and Celeste.

GENOA, WHITE.—Above medium, pyriform; neck small; stalk short; ribs indistinct; skin downy; eye very small; skin pale olive-green; pulp pale rose. One of the better figs, quite distinct from Marseillaise.

GENTILE.—Very large; ovate pyriform; neck short but distinct; stalk very short; skin uneven, with ridges; eye very large, open, with projecting scales; color greenish yellow spotted with white; pulp amber, streaked with rose; seeds few but very large. Only the first crop of this variety ripens. It is of the San Pedro tribe. One of the best early figs.

GROSSE GRISE BIFÈRE.—Medium, ovate pyriform; neck very short, stalk short; ribs distinct; eye small; skin downy, dark violet amber, pale olive in shade; the bloom is separated by a distinct line from the apex; pulp deep red. A tender, good fig.

ISCHIA, BLACK.—Small; neck short; stalk medium; skin smooth; color dark, violet black, greenish around the apex; neck dark; eye medium, open; bloom thin, dark blue; pulp red. Of fair quality but small size.

ISCHIA, WHITE.—Size below medium, round, with small neck; stalk very short; eye open; skin smooth, bluish green with brown flush; pulp rosy red. Common in California, but hardly worthy of cultivation in that State.

MAGDALEN.—Below medium; round; ribs distinct, rough, disappearing around the eye; stalk longer than the fig; eye open, large; skin greenish yellow; pulp amber white. A very delicious fig, superior to the *Ischias* and *Celeste*; not synonymous with *Angelique*.

MARSEILLAISE, LONG.—Large, longer than wide; skin thick with brownish shade; pulp dull red. Requires moist soils. A fair fig which dries well; not related to either *Black* or *White Marseillaise*.

MARSEILLAISE, WHITE.—Medium ovate, pyriform; neck short; stalk medium; ribs numerous and distinct; apex flattened; eye large, open; skin downy, pale yellowish green, mottled with white; pulp amber, with a few large seeds. One of the best figs for drying. Requires sandy, rich soil.

MISSION, BLACK.—Medium to large, turbinate; neck long; stalk short; ribs distinct; eye prominent, open; skin rough, deep mahogany violet, with a red flush; pulp not fine, red, but not bright or brownish amber; sweet but not high-flavored; common in the Southern States, California, and Mexico. The oldest fig in this country.

MONACO BIANCO (syn. *White Monaco*).—Large, rounded, turbinate, flattened; neck small but very distinct; ribs numerous; eye very open; skin dark, bluish green with thin bloom; pulp dark-red rose; a most excellent fig for table; one of the best in California.

PASTILIÈRE.—Large, 3 inches by $1\frac{1}{2}$; elongated, pyriform with long neck; stalk short; eye closed, surrounded by an elevated iris; skin rough, hairy, with blue bloom; pulp red. Fine for preserves.

RONDE NOIRE.—Large, round, but irregular; neck distinct, short; eye small; skin smooth, waxy, dark violet brown; pulp amber. Greatly to be recommended as a table fig. It is not related to *Black Ischia* or *Osborn Prolific*.

SAN PEDRO, BLACK.—Very large, elongated ovate, with no stalk, but with well set neck; skin smooth, violet black with green neck; pulp red, coppery, tinted violet. For table use. The largest fig known. It is not related to the following variety:

SAN PEDRO, WHITE (syn. *Brebas*).—Very large, round, flattened at apex; stalk and neck short; eye open; skin thick, tender, of a bright yellow color or greenish in the shade, without bloom; pulp amber. A remarkable and handsome fig. Only the first crop matures without caprification. Suited only for table use. Requires moist, rich soil.

VERDAL, ROUND.—Below medium, round pyriform, without stalk or

neck; skin smooth, waxy, bluish green; eye closed; pulp dark, blood red. A small fig, but valuable for canning and preserves; better than the Ischias or Celeste. It does well in the Santa Clara Valley, but is inferior in the interior of the State.

CAPRIFICATION.

This process must be practiced wherever the Smyrna figs are grown, for without it they will not mature either seeds or figs. The flowers of the Smyrna figs are all pistillate and require pollination, which in the case of these varieties can be effected on a large scale only through caprification. The process consists in the suspension of wild caprifigs, which possess staminate and gall flowers, in the Smyrna fig trees, when the pistils in the blossoms of the latter are in a receptive condition. A minute wasp, the *Blastophaga*, breeds in the caprifig in large numbers, and on leaving it crawls into the Smyrna fig, covered with the pollen of the caprifig. This pollen, transferred by contact from the body of the wasp to the receptive stigmas of the flowers in the Smyrna figs, effects the fertilization of the ovules of those flowers and causes them to form seeds and mature the fruit of which they are a part. These seeds impart a nutty aroma and flavor to the fig when dried, and give it a marked superiority to our common figs. Caprification is not yet practiced in the United States, the wasp not existing here, though both it and some of the Smyrna figs have been brought to this country several times. The first importation of Smyrna fig trees was made by Gulian P. Rixford, about 1880, when three varieties of Smyrna figs and a single caprifig tree were introduced.

CLIMATE SUITABLE FOR FIG CULTURE.

A native of a semitropical climate, the fig requires a similar climate to attain perfection. Many horticultural varieties, however, have originated in temperate regions, and these can be grown with profit in a climate much colder than that of the habitat of the wild fig. Figs, in fact, may be grown in all regions where peaches and apricots succeed without protection, and if given winter protection they can be profitably grown in such regions near large cities which furnish a market for the fresh fruit at profitable prices.

In considering the suitability of the climate of a region for fig culture, the purpose for which the figs are to be grown must be first determined.

Figs may be grown for drying, for canning and preserving, for sale in the fresh state, or for general home consumption. As the conditions and treatment necessary to produce fruit suited to these different uses vary considerably, each subject will be discussed separately.

FIGS FOR DRYING.

The best dried figs are produced in warm countries, such as the Mediterranean region of Europe, Asia Minor, Upper and Lower California, but especially in Asia Minor, in the valleys near Smyrna. The

conditions of climate there are as follows: The days are moderately warm, the temperature seldom exceeding 90° F. These conditions prevail during the summer, while the figs are growing and ripening. The winter is seldom frosty. The winter climate, however, is of less importance, provided it is not cold enough to injure the young figs or the tips of the branches. Such frosts will not injure the second crop, which is used for drying, but it is a great drawback to the wild fig and to the fig insects, which are necessary to the maturing of the fruit of certain varieties of drying figs. The summer climate is almost rainless, while in winter there are abundant rains. The air in summer is not a dry, desert air, however, but carries considerable moisture. The moisture of the air is an important point, as in a very dry air the figs do not develop high flavor, but are "flat" in taste. During the drying season there should be little or no rain.

FIGS FOR TABLE USE.

Figs are grown for the table as far north as Paris, in France, and in the south of England.

They may be similarly grown in most of the Middle States of the United States. In England figs are grown against walls as dwarf trees or shrubs, and the trees are covered with mats during the winter. In the vicinity of Paris the trees are dwarfed and grown as "suckers," which are bent to the ground in winter and covered with several feet of soil. Only certain varieties are suitable for this culture, which, however, is very profitable. The figs produced are all "first crop" figs, and are as a rule of superior quality.

FIGS FOR PRESERVING, CANNING, AND HOME CONSUMPTION.

Except in the most favored localities in the Southern States and California, these are the uses to which American-grown figs must be devoted. To produce fruit suitable for these purposes, freedom from fogs, from summer rains, and from spring frosts is essential. If there is a choice of locality, a warm southern or eastern exposure is to be preferred. The soil should be well drained, never swampy, and the locality should not be exposed to heavy winds. Elevated bottom lands or benches along creeks are the most favorable localities for figs. Large plains, swampy places, or exposed hillsides are all unfavorable. The nearer the conditions approach those of the Smyrna region the better. Rains during the fruiting season are frequently injurious to figs, causing them to crack and sour. Still, the fruit may be profitably grown where moderate summer rains occur.

SOIL.

All varieties of figs do not require the same kind of soil. Most of them, however, must have a warm, moist, but not wet soil. A very few varieties thrive in a poor, gravelly soil, but most kinds require a deep,

rich loam, containing a considerable percentage of lime, in order to produce superior figs. A moderate proportion of gravel tends to keep the soil warm and is desirable, but the soil must be rich.

PROPAGATION.

The fig tree is easily propagated by the methods commonly practiced with fruit trees. It may be budded or grafted, but is most readily grown from cuttings. These may be planted where the trees are to stand or rooted in the nursery rows and transplanted later to the orchard site. Which method is advisable for any particular site depends upon the conditions there. If the soil and climatic conditions of the proposed location are favorable to the uninterrupted growth of cuttings, it is better and cheaper to plant them directly in the field. If there is any doubt on these points, or if the proper care and attention can not be given them, the better plan is to plant trees with good roots and well-formed heads, grown under favorable conditions by a nurseryman. The best time for making cuttings is after the leaves have fallen, when the fig tree is comparatively dormant. Cuttings may be made of either one year or two year old wood. If the cuttings are to be planted where they can remain, 2-year-old wood is preferable, as longer cuttings can be secured, but if they are to be planted in nursery, yearling wood is best. In either case the wood when freshly cut should disclose a moist surface, covered with small, whitish, milky drops. If dry when cut, it should be discarded. The length of the cutting must be regulated by the condition of the soil. If this is moist and likely to remain so the cuttings may be 12 to 18 inches long. If the surface soil is dry, the cutting should be sufficiently long to have its lower end in moist soil. On very dry soils this may require a cutting 3 or 4 feet in length, though such long cuttings are rarely needed, and in no case except when they are to be planted directly in the orchard. In making the cuttings care should be observed that the lower cut be made just below a joint or node and the upper one just above a joint. The best cutting is one which terminates in a bud and has a smooth, clean cut just below a joint at its base. No matter what the length of the cutting, it should always be planted so deeply that but one joint protrudes above the surface of the soil. This will prevent the drying out of the cutting by the action of sun and wind. It is better to have the top bud covered with earth than to leave a high stump projecting above the surface.

Fig trees may be grown from single eyes or short tips, in boxes filled with moist sand, set in frames and covered with cloth to keep the soil moist and cool. These will make fine trees in time, but they generally require to be a year older than those grown from large cuttings before they are suitable for planting in orchard. Great care should be exercised in removing fig cuttings or plants from one place to another. They dry out readily and a few moments' exposure to the sun or hot, dry wind will seriously damage them. They should never be allowed

to become dry, and should be wrapped in wet sacks or cloths as soon as taken from the trees or from the propagating bed. Cuttings partially dry may be revived by soaking in water, but fig roots once dry are dead and incapable of restoration to life.

SEEDLINGS.

Seedling figs are easily grown from seeds of imported Smyrna figs. These Smyrna figs always possess germinable seeds, as they have been pollinated. It is quite safe to say that any seedling fig so far recorded in this country has originated from seeds of Smyrna figs imported from Asia Minor. The seeds of our common figs are mere shells without germs, and will of course fail to grow. The percentage of trees producing fruit of high quality among seedlings grown from Smyrna figs is very small, however, and a commercial orchard planted with such seedlings would be a failure. The grower may now and then produce a variety which will repay his efforts, and such variety can be propagated for general planting.

BUDDING AND GRAFTING.

The fig may be propagated by shield budding, provided the work is done at the proper time. That time is winter, when the tree is as near dormant as it can be found. Budding is rarely resorted to, however, as it is an uncertain method when done by persons without skill. Grafting the fig is successfully practiced in California by a method invented by Mr. John Rock. It is the only method of fig grafting that has proved reliable, practical, and of real value there. By means of it, new varieties are brought into heavy bearing within three years after grafting on old trees. In addition to this saving of time, the usual advantages resulting from grafting, such as better and stronger stock, more vigorous growth, etc., may also be attained.

The best time for grafting the fig is autumn or winter, when the sap is most sluggish. Late spring grafting is less successful. The best scions are made of 2-year-old wood. The sloping end of the scion must be wedge-shape, tapering from front to back as well as from the top of the cut to the bottom. But one surface of the wedge should show the pith, and this surface should face toward the center of the stock when the scion is set. Incipient fruit buds should be cut away without injuring the scion. The scion should be so placed that the broad side of the wedge will be outside and the narrow edge toward the center of the stock.

For the stock, any limb from 2 to 4 inches in diameter may be used. This should be cut off squarely at the point to be grafted. A downward cut should then be made with a chisel, in such a way that it shall be tangential to the circular stub. It must not pass through the pith of the stub. The cut should run somewhat obliquely downward and outward, in order that the stock may not be split. The scion, which is

about 3 or 4 inches long, must, when inserted, form an angle with the long diameter [pith] of the stock branch on which it is grafted.

It is best to place two scions on each branch grafted. These should be on opposite sides of the stub and they should lean slightly toward each other. The exposed surfaces of the stock and scion should then be heavily waxed and the scions should be held in place by binding with cord or other material. It is best to place a large number of scions on one tree. Four or five branches may be cut off and grafted, but one or two should be left uncut for a year to draw the sap. A large stake should be driven into the ground near each branch grafted, and when the scions have started the new growth should be secured to the stakes to prevent them from breaking off. The trunk and main limbs of the fig tree should be covered with bundles of straw to prevent sunburn. The after-treatment of the new growth is similar to that required in the grafting of other fruit trees. The new growth is strong and rapid and the connection with the stock perfect. Ninety per cent of the grafts may be readily made to grow.

PLANTING.

The proper distance to be given fig trees in the orchard depends upon the size and habit of the variety to be planted. The smaller kinds require 25 feet; the larger ones should be 50 feet apart in every direction. Sometimes other fruit trees are planted between the figs and allowed to remain until the latter become so large that they require the entire space. The fig tree requires an abundance of air and sunshine to mature its fruit, and it is therefore absolutely necessary that the trees be so arranged that they shall not shade one another. After the distance is decided, the laying out and planting require the same general skill, labor, and methods used in planting other permanent orchards. A few points in planting are peculiar to the fig, however, and require special consideration.

DOUBLE TREES.

Trees may be set singly, as standards, in the way commonly practiced with other fruit trees, or they may be set "double"—that is, two trees planted together in one hole and allowed to remain. The latter method has not heretofore been advocated in this country but is worthy of thorough trial. The method consists in planting two long cuttings, about 12 inches apart, in the same hole, allowing them to protrude from the ground a few inches. Both are allowed to grow and the two are treated as a single tree with two stems or standards. The object sought is to produce two distinct stems or trunks, in order that the splitting down of branches may be prevented. In this way trees with low, sloping branches, having their main trunks leaning outward, will be formed and it will be impossible for the trunks, the main branches, or the

smaller ones to split down. Branches split only when they point upward or stand straight out—never when they slope downward from the trunk.

STANDARD TREES.

These may be planted in the usual way, but great care must be taken in shading the roots while the trees are being planted. After they are set, the trunks should be shaded by wrapping them with paper bags or other material, as a sun-burnt tree will never regain its health or bear profitably. Standard trees should only be set for ornament or shade, and even for these purposes the double trees are preferable. The fig tree naturally branches near the ground, and the only way to successfully imitate this habit in cultivation is to plant by the double-tree method.

PRUNING.

The pruning of the fig varies according to the age of the trees and the purpose for which pruning is done. While other fruit trees require yearly, and generally heavy, pruning to insure fruit of good quality, the object in pruning the fig is simply, or at least principally, to keep the tree healthy and give air and light to the fruit. The most important rule to be observed in pruning the fig is that no branch shall be cut off squarely or be cut back so as to leave a stump. This is almost surely fatal to the future welfare of the tree and to the quality and quantity of its fruit. When it becomes necessary to remove a 1-year-old limb the cut should be made at least as far down as the next fork below, and it should be close to a joint in the fork. There should be nothing left but a scar to show that a limb has been cut away. There must be no stump left. The fig tree may require to have its branches thinned out, but it must not be headed back except to correct unsymmetrical growth. In dense trees branches which cross should be removed entirely and in such a way as to give the tree a rounded, dome-like outline, with the lower branches nearly touching the ground. In pruning recently planted trees the object in view is, of course, entirely different, as fruit can not be expected for several years to come. The object of this early pruning is to shape the tree. When two cuttings are set together little pruning is required, as they will generally shape themselves and form two main trunks diverging from each other, but when a single tree is planted it is best to cut back the stem to within a foot of the soil and let it branch from that point. The only case in which it is proper to have a tall standard is when it is desirable to grow trees for shade and pleasure and where the quality of the fruit and its quantity are of but secondary importance. If recently planted fig trees show any tendency toward drying out, the main limbs or the whole trunk should at once be cut back to live green wood.

DEYING AND CURING.

The drying and curing of figs must necessarily differ in different countries, under different conditions, and for different purposes. For home consumption little skill and care are required to produce a palatable and useful article of diet, while figs intended for shipment must be more carefully dried, cured, and packed in order to command a fair price in competition with the imported article.

The fig is mature and ready to dry only when it has attained its proper size and is palatable for eating fresh. When the crop has reached this stage it may be gathered and dried for home consumption, but in order to produce a superior article the figs must be as sweet as possible and very pulpy. Too often do we find figs in the market consisting of nothing but skin and empty seeds, without sweetness, flavor, or pulp. Figs do not ripen all at one time, and the trees must be gone over daily, in order that only the ripest shall be gathered. Before being picked the fig should be soft to the touch; it should be wrinkled, and should hang downward. Some kinds when ripe show white seams or cracks in the flesh. This is generally a sign of complete maturity. Figs will not ripen after picking and never become sweeter than when cut from the tree. Similarly, figs which have once attained their full maturity do not improve and should be dried at once. If allowed to hang longer on the tree they may quickly rot, sour, or mold, and soon become unfit for use. In order to compete with the best imported figs, our figs intended for drying should be very sweet; in fact, the sweeter the better. When freshly cut they should contain 35 per cent of sugar and when dried about 55 per cent. For home consumption they do not need to be so sweet as this, for any palatable figs are useful when carefully dried.

PICKING.

Figs to be dried should never be shaken from the trees, for if bruised and injured they will sour during the drying and become unfit for use. A few figs spoiled in this way will check or prevent the sale of a box of fruit that is in other respects good. Pulling the figs from the trees will also injure them in a similar way. The ripe figs should therefore be cut from the tree with a knife or shears and carefully placed in boxes or trays. Of course, many half-dried figs that drop from the trees may be utilized, but they should first be examined to determine whether they are in good condition, and they must be freed from soil and sand. Our figs do not, as a rule, drop at perfect maturity, but either before or after it. Only the Smyrna figs drop when fully ripe.

For the higher growing varieties a convenient instrument called the "fig cutter" may be used. It consists of a forked stick across which has been nailed a strip of tin plate. Below this is a small bag kept open by a wire. With this "cutter" the higher figs may be reached by running the fork up under the fig, severing it from the branch and causing it to drop into the bag below.

SULPHURING.

Of late years sulphuring figs before drying has become a very common practice among growers. It consists in exposing fresh fruit to the fumes of burning sulphur in air-tight tray holders of varying sizes. The sulphur fumes cause the figs to become semitransparent when dried, and to present an attractive appearance to the buyer. But nothing is more deceptive, for this very handsome appearance hides a more than worthless interior, not only detestable to the taste but also injurious to the health of the consumer. Few persons will buy such fruit a second time. Besides giving a semitransparent appearance to the fruit, the sulphuring prevents fermentation of the figs while drying. This, of course, is of value, and in fact is the only advantage in the process. A short and light sulphuring may therefore be admissible with varieties which otherwise would not dry and cure without souring.

For convenience, the box in which the figs are to be sulphured should not be more than 5 feet high nor more than 7 or 8 feet wide. This will admit two trays abreast. The trays slide on a rack or on a cleat nailed to the sides of the box, and need not be farther apart than just sufficient to clear each other when charged with a single layer of figs. The door must be air-tight, in order that the sulphur fumes may not escape. Two feet of space should be left between the bottom tray and the sulphur pan. The latter, a heavy piece of sheet iron, is heated, but not to redness, and placed on noncombustible supports in the bottom of the box. Two handfuls of sulphur are thrown upon this iron and when it is burning the doors are tightly closed. Exposure to the sulphur fumes for fifteen minutes is sufficient to prevent fermentation during the drying process and leave the figs with a minimum of sour taste. If sulphured longer they become too acid. After removal from the box the figs should be immediately exposed to the sun. Black figs should never be sulphured.

DIPPING FRESH FIGS.

Instead of being sulphured to improve their color and soften their skins, figs may be dipped into a hot solution of salt or saltpeter, or even lye. Unless, however, they are immersed for a long time this dipping will rarely prevent fermentation, though it will prove advantageous in other ways. Figs with a rough and tough skin are especially benefited, the principal effect of the dipping being to soften the skin. But this dipping should be practiced only on figs of inferior quality, the best grades not being improved either by dipping or sulphuring.

In dipping, the figs should first be placed in a perforated bucket and rinsed in cold water, to free them from dust. They should then be transferred to a kettle containing boiling lye, made of 1 pound of potash to 10 gallons of water. An immersion of from one-fourth minute to one minute suffices; the time being regulated according to the size of the figs and the pliability and thickness of the skin. Boiling salt water

may be substituted for the lye water for the dipping of some figs, different varieties requiring different solutions to secure the desired result. After dipping, the figs are dried without rinsing. If salt or saltpeter is used instead of lye, $1\frac{1}{2}$ pounds of either to 50 gallons of water is a proper quantity. Lye is generally used, but the writer prefers salt or saltpeter, either of which gives good results as regards pliability of skin, while the salty taste generally improves the flavor.

DRYING ON TRAYS.

For convenience in handling, wooden or paper trays are commonly used for drying figs in the Western States. By their use the fruit can easily be stacked and sheltered in wet weather. The trays are of various sizes, but a small size, such as $2\frac{1}{2}$ feet by $3\frac{1}{2}$ feet, or $3\frac{1}{2}$ feet by 4 feet, is preferable, as when filled with fruit it can easily be handled by one man, while a larger size requires two men. The drying ground should be a clean space outside the orchard, where the trays may be exposed to the uninterrupted rays of the sun. The figs require all the sunshine obtainable, and the drying ground must therefore be free from the shade of trees or buildings. The drying floor may consist simply of beds of soil elevated a foot above the general level. A drying floor 4 feet wide may be raised 8 inches additionally along one side. The slope toward the sun thus given will insure greater heat. Trays may be placed on strips of wood or scantlings supported by low sawhorses. The sawhorses should be long enough to support two rows of trays abreast. Three scantlings or strips will be required for each pair of sawhorses. They should be of even lengths, as long as obtainable, and the middle one should be larger than the outside ones; 2 by 4 inches for the middle one and 2 by 3 inches for the side scantlings will be found convenient sizes. The figs should be placed singly on the tray, with their eyes all toward one side, and this side of the tray should be slightly raised in order to prevent the contents of very juicy figs from running out during the process of drying. The raising of the trays is the most easily accomplished by placing the 2 by 4 inch supporting strip in the middle of the sawhorses and the 2 by 3 inch strips on either side. Immediately after sulphuring, if that is practiced, or after dipping, the fruit should be spread and the trays distributed on the racks where they will have the full benefit of the hottest sun. This distribution of the trays should be finished before noon each day to secure the best color of the dried product.

The figs must be turned twice a day at first and once a day in the later stages of drying. The turning requires much work and expense, as it can be done well only by hand labor. An inferior product may be turned by placing an empty tray face downward upon a filled one and inverting them, leaving the fruit on the new tray. To produce the best grade of dried fruit, the figs should not touch one another on the trays during the process of drying. During the turning, all inferior figs,

such as those that ferment and puff up, should be culled out and used for vinegar. Figs which show a slight froth at the eye are turning sour and should be removed.

Covering the figs must not be neglected, if a choice article of dried fruit is to be produced. If white figs are left out over night uncovered, they will be discolored. Rain and dew are very damaging and the fruit should be protected from them. This is best accomplished, in California, by stacking the trays one on top of another when rain is expected. The top and sides of the stacks should then be protected with empty trays. If permanent drying beds of gravel and cement are made, a mechanical device for covering the trays with a horizontal canvas curtain can be used, and in this way they can easily be covered every night.

DEGREE OF DRYNESS.

It is very important that drying cease when the figs have reached the proper stage for packing. They must on no account be overdried nor should they be removed from the trays too soon. The proper degree of dryness can be detected by pressing the figs between the thumb and finger. They should be soft and pliable, with the contents distinctly pulpy, and when squeezed the fig should not resume its former shape, but remain pressed. It should be plastic, not elastic nor dry. Underdried figs will spoil in packing, while overdried ones are hard, leathery, and worthless as food or delicacy. The trays must be gone over every day and the properly dried figs taken off, the spoiled ones being removed at the same time. The time required for drying varies from four to sixteen days. Drying within six or seven days yields the best quality of product.

SWEATING AND EQUALIZING.

Dried figs are greatly benefited by being sweated or equalized as regards moisture. This is accomplished by placing them in sweat boxes holding 75 pounds or more. The boxes are stacked up one across another in such a way as to insure a free circulation of air. This is to prevent the sour fermentation, which would spoil the figs. The room where the sweat boxes are stored should be closed and the walls should preferably be of brick. Daily examination of the contents of the boxes should be made, so that any inclination of the fruit to ferment and heat may be detected. In a few days an improvement in the texture of the figs will be noticed, the overdried ones having attracted moisture from those that were underdried and all having become more pliable.

ARTIFICIAL DRYING.

Where figs can not be dried in the open air, evaporators or driers, heated artificially, may be used to advantage, just as in the drying and curing of raisins. Large driers are expensive and are beyond the reach of many growers, but small driers, holding a ton of fruit, may be built

cheaply. It may be safely stated, however, that localities where artificial drying is necessary are not suited to the most profitable production of commercial figs, as any extra handling will greatly increase the cost of the product. Where a very superior article is produced the occasional use of the drier may be profitable, in order to save a crop that would otherwise be injured by inclement weather.

PACKING.

The method of packing dried figs and the kind of package used should vary according to the quality of the finished product. They should be packed in order to prevent drying out, as well as to make them present an attractive appearance. It pays to pack the best grades well, for good packing always enhances the value of fruit.

DIPPING.

The first step in packing is the dipping of the dried fruit, and this must be done whether the figs are packed cheaply or expensively. The dipping, which must be done just before packing, causes the figs to become soft and pliable, equalizes moisture, and improves the skin and its color. Perforated buckets holding 5 gallons of dried figs are suitable vessels for holding the figs during the dipping. A kettle arranged for heating water and large enough to permit the immersion of the bucket of figs should be provided. In this kettle sea water or brine made of one-fourth pound of coarse salt to a gallon of water should be heated to the boiling point. The bucket of figs should then be immersed in this boiling brine for a few seconds and emptied on to wire screens to drain. While draining, the figs should be covered with a cloth or otherwise kept dark. The fruit should be packed on the same day that it is dipped. The best grade of white figs, or very soft figs of any grade, should only be dipped in *cold* salt water, just before packing. The salt water is never washed off, and the salt that remains does not in the least injure the figs, but, on the contrary, improves their quality.

ASSORTING.

The inferior figs which were removed from the trays during the drying process should be assorted into at least two sizes for packing. A yet lower grade which can not be profitably packed may be sold in sacks. The largest Smyrna figs weigh, when dried, about 23 grams [355 grains, or about four-fifths of an ounce avoirdupois], while the average French and Italian figs weigh each about 8 grams [123.45 grains, or a little more than one-fourth of an ounce avoirdupois].

PULLING.

The best grades of figs should be pulled or flattened before packing. This pulling consists first in squeezing the fig with the hand to soften it, and then flattening it so as to shape it into a disk in which the eye

and stalk are nearly in the center of the flat sides, as may be observed in packages of figs imported from Smyrna. The object of this pulling is to have the figs present as fine a surface as possible when they are pressed and packed, this method enabling the packer to hide the eye and stalk ends effectually. For inferior brands it will suffice to simply flatten the figs in such a way that the eye and stalk are at opposite extremities of the fruit when pressed. In pulling and handling the figs, the hands of the worker should always be moistened with salt water to prevent them from becoming sticky with sirup and thus soiling the figs.

PACKING.

The packing should be regulated according to the size and quality of the figs. The size of the boxes will therefore vary, but they may be made to contain 5, 10, or 20 pounds each. In Smyrna the figs are packed in the shape of bars, and this method should be followed for all the better grades. In order to pack quickly in bar fashion, the writer several years ago invented a "bar-packing device" or "guide." This guide consists of a frame of two or three parallel strips of tin or zinc connected at opposite ends by two similar strips. The guide, which is really a metal box without top or bottom, fits exactly into the packing box flush against two of the sides, but is slightly higher than the depth of the box in order that it may be pulled out after filling. The guide is placed in an empty fig box, thus dividing it into three or more compartments. The figs are then placed in rows in each compartment with the eyes downward, each fig slightly overlapping the other, in the way shingles are laid on a roof, just sufficiently to hide the stalks. The compartments in the guide should be slightly narrower, or at most no wider than the figs, so that when pressure is applied the figs will flatten and fill them. The object of the guide is to keep the fig bars separate. After the box is full a slight pressure is applied, which squeezes the figs against the sides of the guide, and when the latter is withdrawn leaves the bars intact without large air holes between the figs or bars.

PRESSING.

The raisin presses used in California are suitable for pressing figs. There is no better machine for this purpose made anywhere. A follower of wood covered with zinc is first placed in each compartment on the figs and a slight pressure applied in the press. The pressure must be strong enough to bring the figs to the level of the box. The guide is then lifted out, while the fingers of the packer press firmly on the follower to hold the figs in place. Instead of having a guide in which the bars are connected at the ends, the box may be grooved on the inside and a single strip of zinc or tin dropped down, thus dividing the box into two or more compartments as may be necessary. The strips are more easily removed than the more complicated guide. Before the box

is nailed up, small leaves of the sweet bay (*Laurus nobilis*) should be inserted between the figs on the surface, and over the whole should be spread a sheet of waxed paper. Instead of the sweet bay leaves, other native laurel leaves may be used, provided they are aromatic, have the distinctive laurel flavor, and are not otherwise objectionable.

It can not be too strongly urged that American-grown figs be packed and sold under their proper labels and not designated "Smyrna" figs. Careful selection of varieties, skill in growing and curing, and careful, honest packing will in time procure a large market for our figs.

In all the Mediterranean countries the fresh as well as the dried fig is a common article of diet, both nourishing and wholesome, and it is only a question of time when its value will be generally recognized in this country.

FIG CULTURE IN THE GULF STATES.

By FRANK S. EARLE.

The fig is a domestic fruit of prime importance in all the Gulf and South Atlantic States; throughout this region it is a common dooryard tree. Its broad, rich foliage is one of the first things to catch the eye of the Northern visitor and assure him that he is really in the South.

Toward its northern limit the tree is sometimes injured by unusually severe winters, but unless killed to the ground it never fails to produce heavy annual crops. Even severe winter-killing is usually but a temporary loss, as the roots send up vigorous sprouts that bear the following year.

Although the fig is so widely distributed and so universally esteemed for household uses, it is only recently that any attempt has been made in the territory under consideration to utilize it as a commercial product. In the search throughout the South for possible money crops, other than cotton, it is beginning to attract attention, and in this connection a brief statement of our present knowledge as to the growth and possible uses of the fig may be of service.

PROPAGATION.

The fig roots easily from cuttings and is usually propagated in this way. Short pieces or even large branches of well-matured wood, cut from the tree at any time during the winter and simply thrust into the soil, will usually take root and make a strong growth the following summer. The well-matured wood is best for making cuttings. One of the most desirable methods is to cut a section bearing a short but thrifty lateral branch from a good-sized limb. The section taken should be 6 or 8 inches long and be entirely buried in the ground, leaving the end of the side branch projecting to form the tree. This is not at all essential, as a straight cutting will usually root and grow readily, but it is desirable, as the buried cross section holds the cutting firmly in the ground and its bulk prevents it from drying out easily. In the coast region cuttings are often planted in August with good results. In this case the leaves should be removed. It is advisable to plant the cutting where the tree is to stand, as fig roots are easily injured by transplanting. Little is gained in growth by planting rooted trees, but when such are used both roots and tops should be heavily pruned when planted, to secure a satisfactory growth.

Sometimes it is advisable to plant the cuttings in the nursery and to keep them there for three years before removing them to their permanent location, as winter protection can be more easily given them. After the trunk of the fig is three years old it is much less easily injured by cold. This practice would seem to be of doubtful value, since young figs are more often injured by late frosts after growth has started in the spring than by the greater cold of midwinter when they are dormant. Figs can be grafted without difficulty, but it is seldom done in the south.

SOIL AND LOCATION.

The fig will grow in almost any location, but it attains its highest development on a rich, moist, but well-drained soil, that contains abundant humus.

A plentiful supply of lime, phosphoric acid, and potash is also needed, and if not contained in the soil must be supplied by fertilization. The best conditions for fig growth are found in the bottoms and hammocks rather than in the sandy uplands, though many fine specimens can be found in either location. In planting for home use it is advisable to plant the trees near the house and about the farm buildings, for they always thrive in such locations, while many failures have been made in attempting to establish them under orchard conditions, especially in the light soils of the "piney woods" region. It is not easy to account for these failures, since the old dooryard trees are so universally healthy and thrifty, though growing without care or attention. Several causes can be cited that may contribute to the result, but all seem insufficient to account fully for the facts observed. There must be some undetected factor that contributes to the almost universal superiority of dooryard over orchard-grown fig trees in the Gulf States.

One of the most obvious difficulties in establishing a fig orchard arises from the fact that the young trees are tender and easily injured by the cold. Figs start very early in the season, and the frequently occurring spring frosts often catch them in quite vigorous growth. This does no great harm to old trees; though the young leaves are killed, they soon push out again, and as the principal crop of fruit is borne on the new wood the crop is not much injured. With young trees, however, it is different, as the tissues of the trunk are softer. Fine, thrifty trees of one or two years' growth are killed to the ground by a slight freeze after their spring growth has started. They may start again from the root, but their vitality is injured and they do not seem to fully recover. Such trees at 3 or 4 years old are often no larger than after the first summer's growth. Young trees also suffer much more severely than old ones from extreme cold in winter, even when entirely dormant. It would appear that the shelter afforded by buildings and yard fences may sufficiently protect young trees from damage, when in an open space they would be severely injured. Then, if from a dozen cuttings stuck down in such out-of-the-way places only two or three

grow, they are seen and remembered, while the failures are forgotten, whereas an orchard row showing a stand of only one-fourth is very unsatisfactory. The dooryard tree usually gets the benefit of ashes and house-slops, and perhaps the wash from the barnyard. These sources of fertility are all beneficial, for the fig is a gross feeder. Its roots are never broken by the plow, which is another great advantage, for the fig has a shallow rooting habit and does not thrive when its feeding roots are disturbed.

In the light soils of the South it is extremely difficult to keep plows and cultivators from running so deep as to do serious injury to fig trees, and the proper cultivation or treatment of a fig orchard is therefore a serious question. Many growers advise against plowing after the first year, but the tree will not thrive if choked with grass and weeds. To keep a large orchard clean with a hoe is no small undertaking. Some advocate heavy mulching to keep down weeds, and that is doubtless often advisable, but the hard, clean-swept southern dooryard seems to suit the root habit of the fig better than any system of cultivation yet devised. Another point to be considered is that the fig suffers severely from root knot when planted in the fields where vegetables or cowpeas have been grown, as the nematodes causing this trouble multiply in the roots of all such crops.

In planting a fig orchard care should be taken to select new land that is known to be free from these pests.

The fig has a spreading habit of growth and when old requires considerable room. As the cuttings cost but little, it is well to plant rather closely, with the expectation of thinning out the trees when necessary. With 200 trees to the acre the earlier crops would be double those obtained from a planting of half that number, though doubtless 100 full-grown trees would sufficiently occupy the land. Twelve by 16 is a suitable distance for the trees when young. Removing alternate rows when needed would leave the permanent planting 16 by 24 feet. It is best to plant two or three cuttings at each place, to be sure of a stand. All but the most vigorous can be cut out if more than one starts to grow.

CULTIVATION AND FERTILIZATION.

Unquestionably figs should be thoroughly cultivated during the first season. This is necessary to give them a good start, and as the young trees make their largest growth after midsummer it is important to continue the cultivation late in the season. Unless the soil is quite rich some fertilizer should be used, as the future of the tree depends largely on its vigor during the first season. An excessive use of stable manure or other nitrogenous fertilizer should be avoided, as the tendency of these is to induce a soft, succulent growth too easily injured by the winter. The "piny-woods" soils are deficient in phosphoric acid, and this should be a prominent ingredient of all fertilizers used in regions where these predominate.

It is not advisable to attempt to cultivate any vegetable crop among fig trees, on account of the danger of increasing root knot, and because such crops are likely to interfere with cultivation at the time when it may be most needed.

The best subsequent treatment for a fig orchard is, to a certain extent, an open question. It is probable that in most locations the best results will be obtained by mulching heavily near the tree with any available material that will hold moisture and keep down the weeds. Pine straw, marsh grass, or planer shavings answer the purpose. The dust from old charcoal pits is sometimes used, and on the coast a mulch of oyster shells is often seen. The slowly decomposing shells probably act to some extent as a fertilizer, since the fig is known to thrive best in strong lime soils. The middle of the rows can be kept clean by a shallow plowing and harrowing without disturbing the mulch and without injury to the roots protected by it. Winter protection of some kind should certainly be provided during the first two or three years, at least to the extent of mounding the dirt or mulch high about the base of the tree in the fall. Protecting the tops with old gunny sacks or pine branches will often prove of great advantage.

Pruning is seldom practiced, except so far as may be necessary to properly shape the young tree, and this is better done in summer by pinching. In case of a freeze, all injured wood should be promptly cut away. It is said that the size of the fruit can be greatly increased by judicious pruning, but, as before stated, it is seldom done.

Figs come into bearing very early. A thrifty growing cutting will often set some fruit the first season, but this seldom matures. When the tree does not winterkill, a little fruit may be expected the second season, and by the third the crop should be of some importance.

INSECT ENEMIES AND DISEASES.

The fig is usually spoken of as being comparatively free from insect enemies, and the literature of its diseases, of which there are a number, is scanty. It is probably true that in most localities it is less frequently injured from these causes than are other fruit trees.

Among the diseases reported from the South the one causing most widespread injury is doubtless root knot.

FIG-TREE BORER.

A longicorn beetle, *Ptychodes vittatus*, has caused considerable injury at some points in Louisiana and Mississippi by burrowing into the trunk and larger branches. In reply to inquiries regarding this insect, Director W. C. Stubbs, of the Louisiana Experiment Station, says:

The damage done in Louisiana is to a large extent conjectural. In our groves we have lost several trees temporarily, all being bored into by this borer. They, however, start up again quickly from the roots and soon replace the injured trees. We have had no remedy against this invasion except to dig it out while very young with a penknife. We have tried various insecticides without any apparent results.

FIG-LEAF MITE.

A browning and subsequent premature falling of the leaves, caused by the work of a minute mite, is reported as rather common in Florida by Mr. H. J. Webber, of the Subtropical Laboratory. It has not been studied.

Mr. Ellison A. Smith, jr., botanist and entomologist of South Carolina Experiment Station, has published a list¹ of insects observed feeding on ripe figs, but he does not mention any that injure the tree.

ROOT KNOT.

This disease is caused by a microscopic nematode or true worm, *Heterodera radicola*,² that infests the soft fibrous roots causing small galls or swellings. When present in sufficient numbers it causes the death of the roots and the consequent starvation and death of the tree. It is by no means confined to the fig, but attacks the roots of many other fruit and ornamental trees and shrubs and is especially injurious to many garden vegetables and farm crops.³ This pest thrives best in moist sandy soils, and is troublesome throughout the entire coast region.

No effective remedy is known when a tree is once infested, hence the necessity for planting on land known to be free from the pest, and the importance of not growing vegetables between the trees that will act as a nurse crop for the disease.

Neal recommends thorough drainage of the land and the application of tobacco dust mixed with unleached ashes or lime as the most promising remedial measures. He advises against the excessive use of ammoniacal manures as producing a soft, succulent root growth favorable to the growth of the nematode. (See Bulletin No. 20, previously cited.)

FIG-LEAF RUST.

Brown spots frequently appear on the foliage during the summer, and, if numerous, cause the leaves to fall prematurely. These spots are caused by a true rust fungus, *Uredo fici* Cast. It occurs quite frequently widely, and abundantly, but as it usually does not develop enough to be noticeable until after the crop is ripe, it seems to do but little harm. No attempt has been made to find a remedy.

FIG CERCOSPORA.

A somewhat similar injury to the leaves is known in Europe, caused by an entirely different fungus, *Cercospora bolleana* (Thum) Sacc. It had not been observed in this country until the summer of 1895, when

¹ South Carolina Experiment Station, Annual Report, 1889, pp. 105, 106. The list is as follows: *Allorhina nitida* (L.), *Ptychodes trilineatus*, *Lybithea bachmanni* (Kirth), *Apatura celtidis* (Bd. Sec.), *Grapta interrogationis* (F.), *Pyrameis atalanta* (L.).

² G. F. Atkinson, "A preliminary report upon the life history and metamorphoses of a root-gall nematode (*Heterodera radicola* (Greeff) Müll.) and the injuries caused by it upon roots of various plants."—Alabama Agr. Exp. Sta. Bul. No. 9.

³ J. C. Neal, in an account of the root-knot disease (Dept. Agr., Div. Ent., Bul. No. 20) gives a list of over 60 species of plants known to be infested by it.

it was found abundantly in Mississippi by S. M. Tracy. A *cercospora*, probably the same species, is also reported from Florida by H. J. Webber. It probably occurs quite commonly, but has been overlooked, its injuries being confounded with those caused by the *Uredo*.

DIE BACK.

A dying of the young shoots in the fall and early winter is sometimes noticed. This occurs before they can have been injured by severe cold and its cause is not known. It usually occurs in feeble trees, those injured by previous winter killing or perhaps those suffering from root knot. A similar trouble is noted by A. F. Barron, of Chiswick, England, (*The Garden*, June 20, 1891, p. 577). He finds it occurring in trees grown in pots, and says it is there seldom noticed in trees growing out of doors.

ROOT ROT.

The fungus *Ozonium auricomum* Lk., which causes a root rot of cotton and of many other plants and trees, has been reported upon the fig,¹ but the extent of damage caused by it is not known. Several other species of fungi are known to occur on the fig, but none of them can be classed as disease-producing organisms.

VARIETIES.

Much confusion exists in the naming of fig varieties. They were first introduced by the early French and Spanish settlers, and there have been more or less frequent importations since. Trees from these various sources have been known under many local names, and it is probable that there are now many more names recorded than we have varieties in cultivation. On the other hand, distinct varieties are often met with that can not be named from published descriptions. In Louisiana and Mississippi it is safe to say that nine-tenths of all the figs grown are of the Celeste variety. This is sometimes written Celestial, but among growers it is uniformly known as Celeste. The tree is hardy and very fruitful. The fruit is small, but it is one of the best in quality. When ripe it is a light yellowish brown, tinged with violet. The flesh is light red, delicate in texture, and very sweet and rich. A number of other varieties occur, but they are known under local names, such as "black fig" or "Spanish fig." More attention has been paid to nomenclature and to the planting of different varieties in other parts of the South, but the Celeste is the favorite in nearly all localities.

Some interesting papers on figs were read at the meeting of the American Pomological Society, held in Florida in 1889, and in the published proceedings of the meeting the following 18 varieties are catalogued among the fruits recommended by the society.

¹Farlow and Seymour, A Provisional Host-Index of the Fungi of the United States, Part 3, p. 183.

List of figs recommended by American Pomological Society.

Alicante; Angelique—synonym, *Jaune Hative*; Brunswick; Blue Genoa; Black Ischia; Brown Smyrna; Celeste; Green Ischia—synonyms, *White Ischia*, *Green Italian*; Lemon; Violet, Long; Violet, Round; Nerii; Pregussata; White Adriatic; White Marseillaise; White Genoa; Superfine de la Sausaye; Turkey—synonym, *Brown Turkey*.

On comparing this list with 11 others furnished by nurserymen and writers on the fig, and taken at random from Texas, Louisiana, Georgia, and Florida sources, we find 14 of these names occurring more or less frequently. Four are not mentioned at all, while 13 additional names appear, making a total of 31 varieties in the 12 lists. Celeste and Brown Turkey lead, being mentioned 11 times each; Adriatic, Lemon, and Brunswick come next, each occurring 8 times. White Marseillaise is mentioned 7 times; White Genoa and Green Ischia, 6 times; Black Ischia, 5 times; and San Pedro, which is not in the American Pomological Society's list, occurs 4 times. We may perhaps conclude that these 10 varieties are the most generally grown in the South, but some of them are to be considered as nurserymen's recent introductions from California, rather than as varieties in general use. They are characterized in the Pomological Society's list as follows:

Variety.	Season.	Color.	Quality.	Size.
Brunswick	Early	Violet	First	Very large.
Black Ischia	Medium	Black	do	Medium.
Celestial (Celeste)	Early	Pale violet	do	Small.
Green Ischia	do	Green	do	Medium.
Lemon	do	Yellow	do	Do.
White Adriatic	do	do	do	do
White Marseillaise	Medium	White	Second	Medium.
White Genoa	do	do	do	Large.
Turkey	Early to late	Brown	First	Do.
San Pedro	Not mentioned	do	do	do

Other lists agree in describing both White Adriatic and San Pedro as very large white figs of the best quality and very desirable where they succeed, but as being tender and nonfruitful in many locations. Celeste, Brown Turkey, and Brunswick are more uniformly commended for hardiness, fruitfulness, and general utility than any others.¹

USES.

At present figs are mostly used for household purposes, comparatively few being prepared for market. They are eaten fresh from the tree or are served on the table with sugar and cream. They can also be stewed and made into puddings and pies, and when canned or preserved they make an acceptable table delicacy throughout the year. On first tasting fresh figs many people are disappointed and think they will not care for them, but on further acquaintance nearly everyone learns to

¹ The canning factories greatly prefer the Celeste, paying one-fourth more for them than for larger, coarser kinds.

like them. If picked at all green the fig exudes a milky, acrid juice that has a rank, disagreeable flavor. When fully ripe this disappears, and in learning to eat figs one should choose only the ripest specimens. The beginner will find eating them at the table with plenty of sugar and cream a pleasant introduction. It is needless to commend this method to those who are acquainted with it.

For canning, figs should be picked when still firm enough to hold their shape. To secure the best results they require the use of more sugar than do some other fruits. If undersweetened they seem tasteless and lacking in quality. The amount of sugar used and the method of procedure vary greatly in different households. A pound of sugar to 3 or 4 pounds of fruit would probably suit most tastes, though some prefer the regular "pound for pound" preserve. Ginger root or orange peel is sometimes added to give variety of flavoring, and figs are often made into sweet pickles by adding spices and vinegar. Figs are sometimes peeled before canning, and this is considered to increase their delicacy of flavor. More frequently, however, they are cooked unpeeled and with the stems on, just as they come from the tree. They hold their shape better and look more attractive when treated in this way, and the difference in flavor, if any, is very slight.

Figs are occasionally dried for household use, but as they ripen at the South during the season of frequent summer showers, this is so troublesome that it is not often attempted. A nice product could doubtless be made by use of fruit evaporators, but these are seldom used far South.

In speaking of home uses for the fig, its value as food for pigs and chickens should not be forgotten. Both are very fond of them, and on many places the waste figs form an important item of their midsummer diet. In fact, no cheaper food can be grown for them.

MARKETING FRESH FIGS.

Ripe figs are very perishable. To be marketed successfully they must be handled with great care. It is best to pick them in the morning, while still cool. They should be taken from the tree with the stem attached—great care being exercised not to bruise them in handling—and placed in small, shallow baskets, in which they are to be marketed. In large packages their weight will bruise them badly. The ordinary quart strawberry basket crate is a suitable package for marketing figs. They will carry better, however, in flat trays, holding but a single layer. This form of package is especially desirable for the larger varieties. Figs should hang on the tree until quite ripe and develop their full sweetness and flavor, but in this condition they are soft and perishable and must be consumed at once. For marketing at a distance it is necessary to pick them while still quite firm. This is unfortunate, for though they will soften and become quite edible, they will lack the fine quality of tree-ripened fruit. This fact will always be an obstacle to the successful introduction of the fresh fig into distant markets. When

picked in right condition the fruit will keep from twenty-four to thirty-six hours at the ordinary temperature and may be shipped short distances by express. Figs ripen in midsummer when the weather is hottest, and this is one reason why they are so difficult to handle. Like other fruits they will keep longer at lower temperatures. They do well under refrigeration, and by using refrigerator cars it is quite possible to put them on the more distant Northern markets in good condition. This has been done experimentally in connection with other fruit shipments, but it is not often attempted. Fresh figs are not known or appreciated in Northern markets, and consequently the demand is too limited to encourage shipments. It seems doubtful if the distant shipment of fresh figs will ever become a profitable business. The fruit is more perishable than any other that is generally marketed. It can be handled only by the most careful and experienced persons, and even then it is not in a condition to show its best quality. Ripening in midsummer, when the Northern markets are crowded with many well-known fruits, and not being specially attractive to the eye, fresh figs would at best gain favor slowly. The fact that many people do not care for them at the first would be another obstacle in the way of their popularity. Moreover, the fig is a tedious crop to handle, when in proper condition for market. It is necessary to pick the trees over carefully every day during the season, or much fruit will be overripe. With large trees, this involves much labor; the acrid juice of the immature figs eats into the fingers of the pickers and packers, while rainy weather occasions heavy loss by the cracking of the fruit, which renders it unfit for market.

Notwithstanding these drawbacks, a limited demand would undoubtedly be created if the fig were placed regularly on the market, for many people are very fond of this fruit. It is quite possible that in sections especially adapted to fig culture, and favored with rapid refrigerator transportation, the shipment may become a business of importance. When a regular home market can be found, even at moderate prices, no crop is more profitable, as the trees bear regularly and abundantly. The only hope for such a home market, except in the immediate neighborhood of large cities, is in increased use by canners.

CANNING FACTORIES.

Everyone likes canned figs. The taste does not have to be educated, as is often the case with the fresh fruit. The factories at Biloxi, Miss., and at New Orleans, La., appreciate this fact, and for several years have been putting increasing quantities of the canned product on the market. Up to the panic of 1893 the demand for these goods was very active, and the canners paid as high as 4 cents per pound for the fresh figs and could not get enough to fill their orders. Since then the demand for all luxuries has fallen off and factories have curtailed their packing, but have not materially reduced the price of the product, which has always been very high. There seems to be no reason, aside from

the larger quantity of sugar required, why figs should not be grown and canned as cheaply as peaches. If this were done the demand would soon be very large. It is in this direction, if at all, that there seems to be an opening for the building up of the fig industry in the South.

The processes used by the factories in canning figs differ somewhat from household methods. They also differ among themselves. Each factory has worked out a plan of its own, the details of which are regarded to some extent as trade secrets. In one factory, whose product has been much admired, the process consists in boiling the fruit at first in a very light sirup, allowing it to cool, and then transferring it with successive heatings and coolings to sirups of gradually increasing density. The whole process requires nearly two days. In the finished product the fig, while holding its shape perfectly, has become partially transparent, and as the final sirup is clear and free from sediment the fruit is very attractive.



BULLETIN No. 6.

U. S. DEPARTMENT OF AGRICULTURE.
DIVISION OF POMOLOGY.

CATALOGUE OF FRUITS

RECOMMENDED FOR CULTIVATION IN THE VARIOUS
SECTIONS OF THE UNITED STATES

BY THE

AMERICAN POMOLOGICAL SOCIETY.

REVISED BY A COMMITTEE OF THE SOCIETY,
T. T. LYON, CHAIRMAN.



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U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,
Washington, D. C., August 18, 1897.

SIR: At the twenty-fourth session of the American Pomological Society, held in Sacramento, Cal., January 16, 17, and 18, 1895, a "committee to confer with the United States Department of Agriculture for the purpose of revising and publishing the fruit catalogue as a bulletin of the Department" was appointed. This was in accordance with a resolution of the society, and met with the approval of the then Secretary of Agriculture, expressed through Mr. S. B. Heiges, then Pomologist of the Department. Pursuant to this arrangement, the work of preparing a revised catalogue of fruits, with special reference to the sections to which the different varieties are adapted, was undertaken by the standing committee of the society on revision of the catalogue in cooperation with the Division of Pomology of this Department. The present compilation being a revised catalogue of fruits, comprising such varieties as have been found best adapted to the various fruit districts of the country, as indicated by the starring in the catalogue, is the result of these joint labors.

There is a large and growing demand for this catalogue from fruit growers, which the society, for lack of funds, has been unable to supply; hence the request that it be printed as a bulletin of the Department, a course explicitly approved by your honorable predecessor under date of January 13, 1897.

Mr. T. T. Lyon, to whose painstaking, intelligent work much of the completeness of the present work is due, is chairman of the standing committee of the American Pomological Society on revision of catalogue, the other members being L. H. Bailey, Henry L. Lyman, Louis A. Berckmans, and C. L. Watrous. Special credit is also due to Mr. W. A. Taylor, assistant pomologist.

With the above explanations, I have the honor to recommend the publication of the present catalogue as Bulletin No. 6 of this Division.

Very respectfully,

G. B. BRACKETT, *Pomologist.*

Hon. JAMES WILSON,
Secretary of Agriculture.

In accordance with agreement, publication as recommended is hereby authorized.

JAMES WILSON,
Secretary of Agriculture.

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INTRODUCTION.

In submitting the accompanying report to Hon. P. J. Berckmans, president of the American Pomological Society, the chairman of the committee on revision of catalogue desires to state as follows:

With the increased number of political divisions to be represented, together with the rapid and extensive development of pomology, especially in the direction of commercial fruit culture, the catalogue, in its original and time-honored form, has become cumbersome and inconvenient.

Arrangements having been effected for its publication and extensive distribution by the United States Department of Agriculture, it has been deemed advisable to change the form of the volume so as to better adapt it to popular use.

After due consultation with various persons, both officials and others, this has been rendered practicable through the adoption of the plan of starring for pomological districts rather than for States.

Owing to the failure to receive revisions of lists of varieties, with needed descriptions and starring, from many important fruit-growing localities, and especially to the adoption of the plan of combining the lists and the starring of several States in a single district, and still further to the fact that the former starring represents States only, this revision must unavoidably be liable to errors. These can only be surely corrected through the agency of subsequent reports by persons or committees familiar with the pomology of the districts they represent.

For more convenient reference northern and tropical fruits are classified, alphabetically, in separate divisions; and species and varieties are also classified, alphabetically, in sections and subsections.

Since the revision has been in present hands, owing to lack of reports there has been in very many cases inability to bring and keep the revision up to date, with the result that in many cases there is reason to suspect that, to some extent, at least, the varieties recommended may have become more or less obsolete.

Notwithstanding the earnest efforts of the chairman of the general fruit committee prior to the last meeting of the society (January, 1895), the responses were so very few, and often so imperfect, that a revision would necessarily have been little more than a reprint. Such revision was therefore deferred.

During the past year, by earnest appeals (in many cases to persons other than officials or members of the society), a large amount of material has been secured for the purpose, although much of it proves unsuited for use in the revision, as in many cases it includes numerous new or local varieties which, although more or less of them may ultimately prove widely valuable, are yet too little known to warrant their insertion in a general catalogue.

Reports have been received from W. S. Devol, Arizona; John T. Stinson, Arkansas; N. S. Platt, J. H. Hale, and R. S. Hinman, Connecticut; A. H. Manville, Florida; G. H. Miller, Georgia; C. L. Watrous, Iowa; G. C. Brackett, Kansas; D. H. Knowlton, Charles S. Pope, and W. M. Munson, Maine; J. S. Harris, Minnesota; S. M. Tracy, Mississippi; L. R. Taft, Michigan; W. B. Harlan, Montana; L. L. Van Slyke, New York; W. W. Farnsworth, Ohio; George C. Butz and H. M. Engle, Pennsylvania; L. F. Kinney, Rhode Island; R. L. Watts, Tennessee; T. V. Munson, A. M. Ragland, and F. T. Ramsey, Texas; W. B. Alwood, Virginia; J. A. Balmer, Washington; John A. Myers, West Virginia, and E. S. Goff, Wisconsin. Valuable aid has also been rendered by W. A. Taylor, assistant pomologist, Washington, D. C., to whom the preparation of the map of pomological districts is largely due.

T. T. LYON,

Chairman of Committee on Revision of Catalogue.

PLAN OF THE CATALOGUE.

The catalogue includes such species and varieties of fruits and nuts as are recommended for cultivation in the United States and in British America, and these are arranged alphabetically in three divisions, namely:

Division 1. Species adapted to the climate of northern regions, including the Northern and Middle United States and the adjacent portions of British North America.

Division 2. Tropical and semitropical fruits.

Division 3. Species of indigenous and introduced fruits and nuts not included in the foregoing divisions, which have not, under cultivation or otherwise, so far departed from their specific types that the variations have been designated and propagated under recognized varietal names.

The districts within which a variety is found successful are indicated by an asterisk (*); if especially desirable, by two asterisks (**); if promising, but not fully tested, by a dagger (†); and if tested and found undesirable, by the minus sign (—).

Prefixes, suffixes, secondary words, and apostrophic or possessive terminations, together with words whose significations are expressed in the descriptive columns, are eliminated from the names of varieties when not required to insure identity, and such words, when used, together with synonyms, are *italicised*.

Size and quality, as usually expressed in pomological phraseology, are stated in the tabulations of varieties upon the scale of 1 to 10, as follows:

Size.	Scale.	Quality.
Very small	1	Very poor.
Small	2-3	Poor.
Small to medium	3-4	Poor to good.
Medium	5-6	Good to very good.
Medium to large	7-8	Very good.
Large	8-9	Very good to best.
Very large	10	Best.

Foreign names of varieties are only anglicised in the interest of brevity or for convenience of pronunciation.

The entire region represented is divided into the following fifteen pomological districts, with little regard to State or provincial boundaries, but with primary reference to the influence of latitude, elevation, prevailing winds, and oceanic and lacustrine exposures upon their adaptation to pomological pursuits (see map, p. 10):

District No. 1.—Maine above 500 feet elevation; New Hampshire, Vermont, and New York north of latitude 44° ; upper Michigan, together with Manitoba east of the ninety-fifth meridian; Ontario north and east of Lake Simcoe; Quebec, New Brunswick, and Prince Edward Island.

District No. 2.—Nova Scotia; Maine below 500 feet elevation; New Hampshire, Vermont, and New York south of latitude 44° ; Ontario south and west of Lake Simcoe; lower Michigan; Wisconsin east of the eighty-ninth meridian; Ohio north of latitude 40° ; Pennsylvania above 500 feet elevation; Connecticut, Rhode Island, and Massachusetts, together with a portion of northern New Jersey.

District No. 3.—Southern New Jersey; Pennsylvania below 500 feet elevation; Delaware; Maryland and Virginia below 500 feet elevation.

District No. 4.—The mountain region of Virginia, North Carolina, and South Carolina; Georgia and Alabama above 1,000 feet elevation; Kentucky and Tennessee above 500 feet elevation; Ohio south of latitude 40° ; West Virginia and western Maryland.

District No. 5.—North Carolina, South Carolina, and Georgia below 1,000 feet elevation.

District No. 6.—Florida,¹ the Gulf coast of Alabama, Mississippi, Louisiana, and Texas below 100 feet elevation.

District No. 7.—Alabama, Mississippi, and Louisiana between 100 and 500 feet elevation; Texas east of the ninety-seventh meridian and between 100 and 500 feet elevation; southeastern Arkansas, small portions of southeastern Missouri and southern Illinois; western Kentucky and Tennessee below 500 feet elevation.

District No. 8.—Indiana; Illinois (except the small portion at the extreme south below 500 feet elevation included in District No. 7), and a portion of northern Kentucky adjacent to the Ohio River.

District No. 9.—Iowa south of latitude 42° ; Missouri; northwestern Arkansas above 1,000 feet elevation; Oklahoma; Indian Territory; Kansas, and Nebraska.

District No. 10.—Wisconsin west of the eighty-ninth meridian; Minnesota; Iowa north of latitude 42° .

District No. 11.—North and South Dakota, Montana, and Wyoming, with the adjacent provinces of Manitoba, Assiniboia, and Alberta.

¹The portion of District No. 6 (in Florida) lying south of latitude 27° is assumed to be the only region in the United States possessing a tropical climate. Such varieties as are reported successful only in that locality are indicated by the letter *s* in connection with the starring of this district.

District No. 12.—Colorado, Utah, and Nevada, with the portions of Arizona, New Mexico, and Texas north of latitude 35°.

District No. 13.—Texas west of the ninety-seventh meridian and south of latitude 35°, omitting the Gulf Coast region below 100 feet elevation (included in District No. 6), and including the portion of New Mexico south of latitude 35°.

District No. 14.—Arizona south of latitude 35°; California south of latitude 39°, including all points in the valley of the Sacramento River up to 1,000 feet elevation.

District No. 15.—California north of 39°, except the portion of the valley of the Sacramento River included in District No. 14; Oregon, Washington and Idaho, and the adjacent province of British Columbia.

CATALOGUE OF FRUITS.

27 1897

Division I.—FRUITS MAINLY ADAPTED TO NORTHERN LOCALITIES.

This division includes such cultivated species, commonly designated "hardy" fruits and nuts, as have developed distinct varieties which are propagated on a commercial scale by some of the various methods of bud propagation.

Section 1.—APPLES. (*Pyrus*.)

SUBSECTION 1.—CRABS. (*P. BACCATA*.)¹

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; i, irregular; o, oblate; ob, oblong; ov, ovate; r, round. Color: g, green; r, red; ru, russet; s, striped; w, white; y, yellow. Flavor: a, acid; m, mild; s, sweet. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; vl, very late. Use: c, cider; d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Eng., England; Eur., Europe; Fr., France; Ger., Germany; Holl., Holland; Ont., Ontario; Rus., Russia; Scot., Scotland.]

Name.	Description.								Districts and starring.														
	Size.	Form.	Color.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Beach	5	r	r	a	5	em	km	Am.										**					
Brier	7	r	r	a	5	em	km	Wis.										**		†			
Elgin	7	rob	yr	a	6	l	km	Ill.	*	*													
Excelsior	8	ro	ysa	a	6	e	k	Minn.	*	*													
Gibb	6	o	yr	a	9	e	k	Wis.										*					
Hyslop	6	r	r	a	3	em	km	Am. f.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Martha	5	o	yr	a	5-6	e	k	Minn.	*	*								*					
Marengo	6	ro	yr	a	3-4	l	km	Ill.	†	*								*					
Minnesota	10	ob	yr	a	5	l	km	Minn.												†			
Montreal	8	rob	yr	a	3-4	ml	ckm	Am.	*	*						*	*	*	*				
Orange	5	r	y		3-4	l	k	Am.	*	*								*	*				
Red Siberian	4	rob	r	m	3-4	e	k	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Spitzenburg	3-4	r	rru	ms		vl		Am.			*							*	*				
Transcendent	5	r	yr	a	5-6	e	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Van Wyck	8-9	rc	wr	s	4-5	e	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Whitney No. 20	8	rc	r	m	8-9	em	dkm	Ill.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Yellow Siberian	5	r	y	a	3-4	e	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—APPLES. (*P. MALUS*.)

Alexander	10	oo	ys	ma	5	em	km	Rus.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Antonovka	6	ove	y	ma	7	m	km	Rus.															
Arkansas (<i>Mam.</i> <i>Blk. Twig</i>)	9	ro	yr	m	9	l	km	Ark.			*	*	*	*	*	*	*	*	*	*	*	*	*
Arnold	5-6	o	yr	m	5-6	m	dm	Ont.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Autumn Bough	5-6	rc	gy	s	5-6	m	d	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Autumn Swaar	9	rc	yr	m	5-6	em	d	Am. f.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Balley Sweet	8-9	r	r	s	7-8	ml	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Baker	8-9	roc	yr	m	5-6	l	cm	Conn.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Baldwin	7-8	roc	yr	m	5-6	vl	km	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Baltimore	5-6	rc	ys	m	5-6	vl	dm	Am. f.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

¹ Includes such possible hybrids as strongly manifest Crab parentage.

Section 1.—APPLES. (Pyrus).—Continued.

SUBSECTION 2.—APPLES. (P. MALUS).—Continued.

Name.	Description.								Districts and starring.														
	Size.	Form.	Color.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Belmont.....	8-9	rc	yr	m	9	l	d	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ben Davis.....	6-9	rov	ysr	m	4	l	d	Ky.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Benoni.....	4-5	ro	ysr	m	7	e	m	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bentley.....	5-6	ro	ygr	s	5-6	vl	k	Va.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bethlehemite.....	5-6	oc	ysr	m	5-6	vl	dkm	Ohio.?	†	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bevan.....	5-6	oc	ysr	m	4	e	dm	N. J.	†	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bietighemer.....	10	oc	wyr	m	4	em	m	Ger.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Black, Jersey.....	5-6	ro	r	m	4	l	d	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Blenheim.....	8-9	roc	ysr	ma	4	ml	km	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Blue Pearmain.....	9	rc	rs	m	6	l	dm	Am.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bonum.....	5-6	o	yr	m	6	ml	d	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Borovinka.....	6	rob	ysr	ma	7	em	km	Rus.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bough, Sweet.....	8	y	ov	s	8	e	d	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bradford <i>Best</i> (Kentucky Red).....	5-6	rc	ysr	m	4	l	dm	Tenn.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Broadwell.....	6	oc	yr	s	7	l	dk	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bruce.....	7-8					em		Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Buckingham.....	6-8	oc	ygr	m	7-9	l	km	Va.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Buffington.....	4-5	o	wyr	m	5-6	e	dk	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bullock (American Golden Russet).....	4	rov	yru	m	8-9	l	d	N. J.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Buncombe (Red Winter Pear- main).....	5-6	robe	wyr	m	4-5	l	dm	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Camack.....	5-6	rc	ygr	s	4	l	dk	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Camptfield.....	5-6	rc	ygr	s	3	vl	c	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Canada Reinette.....	10	oci	yrru	m	7-8	l	dm	Fr.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cannon Pearmain.....	5-6	rc	ysr	m	5-6	l	dm	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Carter Blue.....	8-9	ro	gr	m	5-6	m	d	Ala.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Champlain (Nyack).....	7	robe	yr	m	5-6	em	dm	N. Y.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chenango.....	6-7	obe	yr	m	8	e	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Clark Pearmain.....	5-6	roc	ygr	m	5-6	m	dm	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Clayton.....	8	oc	ysr	m	4	l	k	Ind.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Clyde Beauty.....	8	rcf	gr	m	4	l	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cogswell.....	7-8	ro	yr	m	7	l	dm	Conn.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Colvert.....	9	oc	yr	m	4	m	m	Am.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cooper.....	8	rol	ysr	m	4	m	m	Am.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cooper Market.....	5-6	oc	ysr	nu	4	l	m	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cornell Fancy.....	5	obe	ysr	m	6-7	em	d	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cracking.....	9	roc	yr	m	4	m	k	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cullasaga.....	6-7	rc	yr	m	4	l	m	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Danvers Sweet.....	5-6	rob	yr	s	5-6	l	km	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Disharoon.....	5-6	rc	gw	m	4	m	d	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Domine.....	5-6	o	ygr	m	5	l	m	N. Y.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Drap d'Or.....	8	ro	y	m	5	m	d	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Dutch Mignonne.....	5-6	roc	yr	m	4-5	l	dk	Holl.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Dyer (Pomme Roya).....	5-6	r	yr	m	9-10	em	d	Fr.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Cooper.....	5-6	ro	yr	m	5	e	m	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Harvest.....	5-6	ro	ywr	ma	9	ve	dk	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Joe.....	3-4	oc	ysr	m	10	e	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Pennock.....	7-8	rcf	yr	m	4	e	d	Am.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Ripe.....	5-6	ro	y	m	3-4	e	dm	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Strawberry.....	4	rc	ysr	m	6-7	e	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Edward Early.....								?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
English Russet.....	5-6	rc	yrru	m	5-6	vl	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Esopus.....	8	obe	r	m	10	l	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Evening Party.....	4-5	o	ysr	m	5-6	l	d	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ewalt.....	8	rc	yr	m	4-5	l	k	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fallawater.....	10	rc	ygr	m	4	l	m	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fall Harvey.....	8-9	rol	yr	m	4-5	m	dk	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fall Jenetting.....	8-9	oci	yr	m	3-4	m	m	Conn.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fall Orange.....	8-9	r	yr	ma	3-4	m	k	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fall Pippin.....	10	roc	yr	m	10	m	dk	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fall Wine.....	7-8	ro	ysr	m	7-8	m	d	Am.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fameuse.....	5-6	ro	ysr	m	8-9	m	dm	Fr.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Family.....	5-6	oc	ysr	m	5-6	em	d	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fanny.....	8-9	roc	rs	m	5-6	e	m	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Farrar (Robinson Superb).....	8-9			m	4	e	dm	Va.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ferdinand.....	8-9	o	y	m	4	l	d	S. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fink.....	3-4	o	wyr	m	4-5	vl	m	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fulton.....	5-6	o	yr	m	4-5	l	m	Ill.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Gabriel.....	5-6	ro	wgr	m	4-5	m	d	?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Gano.....	7-8	oi	ysr	m	5	ml	m	Mo.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 1.—APPLES. (Pyrus.)—Continued.

SUBSECTION 2.—APPLES. (P. MALUS.)—Continued.

Name.	Description.								Districts and starring.															
	Size.	Form.	Color.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Garden Royal.....	4-5	roc	ysr	m	10	e	d	Mass																
Garrettsen.....	5-6	re	y	m	4	e	k	N. J.																
Gideon.....	5-6	re	y	a	5	e	k	Minn																
Gilpin.....	5-6	rob	ry	ma	4	vl	ko	Va.																
Golden Russet (N. Y.).....	4-6	ro	yru	m	5-6	l	dm	Eng																
Golden Sweet.....	5-7	ro	y	s	4-6	e	dk	Conn																
Golding(American Golden Pippin).....	6-8	roc	yr	m	5-6	m	dk	Am																
Gravenstein.....	8-9	oi	yr	ma	5-6	em	dkm	Ger																
Gravenstein, Rus- sian.....	8	e	rs		9	e	dm	Rus																
Green Cheese.....	5-6	oi	gy	m	3-4	l	km	Tenn																
Green Newtown.....	5-6	ri	gr	ma	10	vl	dkm	N. Y.																
Green Sweet.....	5-6	roc	gy	s	4	l	k	Mass																
Grimes Golden.....	5-6	roc	y	m	7-9	l	d	Va.																
Groch (Western Beauty (H)).....	9-10	ro	ysr	m	4-6	l	m	Pa.																
Haas (Fall Queen).....	5-7	oc	gyr	m	4-6	em	km	Mo																
Hall.....	3-4	oc	r	m	5-6	l	d	N. C.																
Hartford Sweet.....	5-7	ro	ygr	s	4	vl	km	Conn																
Hawthornden.....	5-7	ro	yr	a	3-4	e	km	Scot																
Hewes Crab.....	3	r	rgy	a	2	m	c	Va.																
Hibernal.....	5-7	obe	rs		5	m	km	Rus																
Higby.....	5-6	re	yr	s	7-8	ml	dk	Ohio																
Hightop Sweet.....	4-6	r	y	s	5-6	e	d	Mass																
Hockett.....	5-6	ro	ysr	s	3-4	l	m	N. C.																
Holland Pippin.....	10	ro	yr	m	4	em	k	?																
Hoover.....	5-6	ro	ysr	m	5-6	l	km	S. C.																
Horn.....	4-6	o	ysr	m	3-4	l	m	Ga.																
Horse.....	7-8	r	yru	m	3-4	e	c	N. C.																
Hubbardston.....	7-8	rov	ysr	m	8-9	l	dm	Mass																
Hunt Russet.....	4-6	roc	yru	m	7-8	l	d	Mass																
Huntsman.....	8-9	oc	yr	m	5-6	l	dm	Mo																
Hurlbut.....	5-6	oci	ysr	m	4-6	ml	dm	Conn																
Jeffers.....	5-6	oc	ysr	m	8-9	e	d	Pa.																
Jefferson County.....	5-6	roc	ysr	m	4-6	m	d	N. Y.																
Jennings.....	8-9	o	g		3-4	e	d	Ohio																
Jersey Sweet.....	5-6	roc	ysr	s	8	em	dk	N. J.																
Jewett Red.....	5-6	ro	grs	m	4-6	l	d	N. H.																
Jonathan.....	5-6	re	yr	m	8-9	l	dkm	N. Y.																
Julian.....	6-7	re	wrs	m	4-6	e	d	N. C.																
July (Fourth of July).....	4-6	roc	wyr	m	3-4	ve	em	Ger.																
Junaluskee.....	5-6	ro	y	m	4-6	l	d	N. C.																
Kent Beauty.....	10	ro	gyr	m	3-4	m	k	Eng																
Keswick.....	6-7	ci	gyr	a	5-6	em	k	Eng																
Kinnaid.....	5-6	oci	yr	m	5-6	l	dk	Tenn																
Kirkbridge.....	4-5	obi	yw	m	3-4	e	dk	Am.?																
Lady.....	1-2	o	yr	m	6-7	l	dm	Fr.																
Lady Sweet.....	7-8	rov	ygr	s	6-8	l	dk	N. Y.																
Lansingburg.....	5-6	ro	yr	m	3-4	vl	m	N. Y.																
Late Strawberry.....	5-6	re	wrs	m	5-6	m	d	N. Y.																
Lawver (DeLa- ware Red Win- ter).....	7-8	ro	r	m	5-6	vl	dm	Mo																
Limber Twig.....	6-7	roc	gyr	m	3-4	vl	m	N. C.?																
Longfield.....	5-6	re	y	m	5-6	e	k	Rus																
Long Island Russet.....	3-4	r	yru	m	3-4	ml	c	N. Y.																
Loudoun.....	7-8	oc	yr	m	4-6	ml	d	Va.																
Lowell.....	8-9	ob	y	m	6-7	e	km	Am																
Lyscom.....	8-9	r	gyr	m	4-6	em	d	Mass																
McAfee.....	7-8	ro	ygr	m	4-6	vl	m	Ky																
McIntosh.....	6-7	ro	wyr	m	5-6	ml	dm	Ont																
McLellan.....	5-7	roc	ysr	m	5-6	m	d	Conn																
McMahon.....	7-8	ro	yw	m	3-4	m	dm	Wis																
Maiden Blush.....	5-6	o	yr	m	4-6	e	km	N. J.																
Mangum.....	5-6	oc	ysr	m	6-8	m	d	Ala.																
Mann.....	6-7	ro	yr	m	4-6	l	mk	N. Y.																
Manomet.....	5-6	ro	yr	s	5-6	e	kd	Mass																
Margaret, Early Red.....	5-6	ro	yr	m	3-4	e	d	Eng																
Mason Stranger.....	5-6	o	yr	m	5-6	l	d	Va.																
Mattamuskeet.....	5-6	roc	yr	m	8-4	l	k	N. C.																

Section 1.—APPLES. (Pyrus.)—Continued.

SUBSECTION 2.—APPLES. (P. MALUS.)—Continued.

Name.	Description.								Districts and starring.														
	Size.	Form.	Color.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Maverack.....	7-8	ro	yr	s	4-6	l	mk	S. C.					*										
Melon, Norton.....	6-7	roc	ys	m	10	l	dm	N. Y.						*									
Minister.....	7-8	oc	ys	m	3-5	ml	dm	Mass					*										
Minkler.....	5-6	rc	gyr	m	6-8	l	m	Pa.															
Missouri Pippin.....	6-8	ro	ys	m	3-4	l	m	Mo.					*										
Monmouth.....	7-8	oc	ys	m	6-8	l	dm	N. J.						*									
Moore Sweet.....	5-6	ro	r	s	3-4	l	k	Am. I.					*										
Mother.....	5-6	rc	yr	m	8-9	ml	d	Mass					*										
Munson.....	5-6	o	yr	s	5-6	ml	k	Mass					*										
Nanacmond.....	5-6	roc	ys	m		l	dk	Va. I.															
Newtown Spitzen- burg.....	5-6	oc	ys	m	10	l	d	N. Y.					*										
Nickajack.....	8-9	oc	ys	m	5-6	l	m	N. C.					*										
Northern Spy.....	8-9	roc	ys	m	8-9	ml	dkm	N. Y.					*										
Northwestern <i>Greening</i>	8-9	rc	gy	m	6	l	km	Wis.															
Oconee.....	8-9	ro	yr	m	4-5	m	dk	Ga.					*										
Ohio Nonpareil.....	7-8	r	yr	m	5-6	m	dm	Ohio.															
Ohio Pippin.....	8-9	ro	yr	a	5-6	ml	k	Ohio?															
Oldenburg, <i>Duch-</i> <i>ess of</i>	5-6	o	ys	a	4-5	e	km	Rus.					*										
Ontario.....	5	ob	wyr		6	l		Ont.															
Orange Pippin.....	5-6	r	y		2-3	ml	c	Fr....															
Ortley.....	7-8	robc	gyr	m	6-7	ml	dm	N. J.					*										
Otoc.....	5-6	ros	ys	m	6-7	l	dm	Nobr					*										
Paragon.....	10	rc	ys	m	8-9	l	dm	Tenn.					*										
Peach Montreal.....	5-6	rc	ys	m	5-6	l	dn.	Fr.															
Peach Pond.....	5-6	o	ys	s	5-6	em	dk	N. Y.															
Perry Pleasant.....	7-8	ro	yr	m	8-9	l	dkm	R. I.					*										
Perry Russet.....	5-6	rc	ys	m	5-6	ml	dk	N. Y.					*										
Pewaukee.....	7-8	ro	ys	m	5-6	l	km	Wis.					*										
Pleasant Valley.....	5-6	rc	gyr	m	6-7	m	d	N. J. I.					*										
Plumb Cider.....	5-6	rc	ys	m	5-6	m	dm	Wis. I.					*										
Pomme Gris.....	3-4	rc	ys	m	8-9	ml	d	Eur. I.					*										
Porter.....	7-8	obc	yr	m	8-9	em	dm	Mass					*										
President.....	8-9	ro	yr	m	5-6	em	m	N. H.					*										
Primate.....	5-6	rc	yr	m	9	e	d	N. Y.					*										
Pryor Red.....	5-6	o	gyr	m	7-8	l	dk	Va. I.					*										
Pumpkin Sweet (Pound Sweet).....	10	r	gw	s	5-6	ml	k	Conn.					*										
Quince, Cole.....	7-8	ro	y	a	5-6	e	k	Fr.					*										
Ralls Genet.....	7-8	oc	ys	m	6-7	vl	m	Pa.					*										
Rambo.....	5-6	o	wyr	m	5-6	m	dk	Pa.					*										
Ramsdell Sweet.....	7-8	obc	r	s	6-7	m	km	Am.					*										
Red Astrachan.....	7-8	rc	rgy	a	5-6	e	km	Russ.					*										
Red Canada.....	5-6	oc	yr	m	8-9	l	dm	Am.					*										
Red June.....	3-4	ove	r	m	5-6	ve	d	N. C. I.					*										
Red Stripe.....	5-6	obc	wr	m	5-6	e	km	Ind.					*										
Rhode Island <i>Greening</i>	8-9	ro	gy	a	7	l	dkm	R. I. I.					*										
Ribston.....	5-6	r	yr	a	7	l	dk	Eng.					*										
Ridge Pippin.....	7-8	rel	ys	m	5-6	l	m	Pa. I.					*										
Robertson White.....	5-6	ro	gy	m	5-6	m	d	Va.					*										
Rolle.....	8	o	ys	m	8	m	dkm	Me.					*										
Romanite South.....	2-3	ro	yr	m	6-7	l	d	Am. I.					*										
Roman Stem.....	3-4	r	wyr	m	7	l	dk	N. J.					*										
Rome Beauty.....	8-9	rc	ys	m	5-6	ml	dkm	Ohio.					*										
Roxbury.....	5-6	ro	ys	m	7-8	l	km	Mass					*										
Russell.....	rov	yr			10	e	d	Am.					*										
Saint Lawrence.....	8-9	oc	ys	m	6-7	m	dm	Am.					*										
Scott Winter.....	5	rc	ra	a	7	l	km	Vt.					*										
Shiawassee.....	5-6	o	wra	a	7-8	m	dkm	Mich.					*										
Shockley.....	3-4	rc	yr	m	5-6	l	dm	Ga.					*										
Smith Cider.....	7-8	roc	yr	m	5-6	l	km	Pa.					*										
Smokehouse.....	6-7	ro	yr	m	5-6	ml	k	Pa.					*										
Sops of Wine.....	5-6	r	yr	m	5-6	e	d	Eur.					*										
Stark.....	7-8	robc	ys	m	5-6	l	m	Ohio I.					*										
Starkey.....	8-9	ocr	ys	m	8	ml	dkm	Me.					*										
Stephenson.....	5-6	rob	ys	m	5-6	l	dm	Mass					*										
Sterling (Ameri- <i>can Beauty</i>).....	8-9	rc	yr	m	7-8	l	d	Mass					*										
Stott Russet.....	rov	ys			10	e	d	Ont.					*										
Striped Pippin.....	7-8	rob	ra	m	5	m	km	Am.					*										
Summer King.....	7-8	ro	ys	m	5-6	e	dk	N. C. I.					*										
Summer Paradise.....	8-9	r	gy	s	6-7	e	k	Pa.					*										

Section 1.—APPLES. (Pyrus.)—Continued.

SUBSECTION 2.—APPLES. (P. MALUS.)—Continued.

Name.	Description.								Districts and starring.															
	Size.	Form.	Color.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Summer Pearmain	5-6	oc	rru	m	10	em	d	Am.																
Summer Pound	8-9	rc	gw	m	6-7	e	m	Am.																
Summer Queen	7-8	rc	yrs	a	5-6	e	km	Am.																
Summer Rose	4-5	r	yrs	m	8-9	ve	d	N. J.																
Sutton	6-7	roc	yrs	m	5-6	l	dm	Mass.																
Swaar	7-8	ro	gy	m	10	l	d	N. Y.																
Sweet Belle Bonne	6-7	roc	gyr	s	5-6	m	k	Am.																
Sweet Winecap	5-6	oc	r	s	6-7	l	dk	Pa.																
Switzer	5-6	r	wr	m	7-8	e	k	Rus.																
Taunton	7-8	oc	yrs	a	5-6	m	k	{Ala. {Ga.																
Tetofski	5-6	roc	yrs	a	5-6	e	m	Rus.																
Titovka	7-8	oci	yrs	m	5-6	e	km	Rus.																
Tolman Sweet	5-6	ro	yr	s	6-7	l	km	R. I.																
Tompkins King	8-9	roc	yrs	m	8-9	l	dem	N. J.																
Townsend	5-6	oc	yrs	m	6-7	e	dm	Pa.																
Trenton Early	6-7	ci	yg	m	5-6	e	km	Am.																
Twenty Ounce	10	r	yrs	m	6-7	ml	km	Conn.																
Vandevere	5-6	o	yrs	m	5-6	ml	km	Del.																
Virginia Greening	8-9	o	gyr	m	5-6	l	m	Am.																
Wagner	6-7	ro	yrs	m	8-9	l	dm	N. Y.																
Walbridge (Edgar Red Streak)	5-6	oc	yrs	m	5-6	l	m	Ill.																
Washington Strawberry	8-9	oc	yrs	m	7-8	e	dm	N. Y.																
Watson, Carolina	8-9	oc	grs	m	5-6	e	d	Am.																
Waugh Crab	2-3	rc	r	m	5-6	l	c	Va.																
Wealthy	5-6	ro	yrs	m	6	m	dkm	Minn.																
Westfield	7-8	rc	gr	m	8-9	ml	dm	Conn.																
White Juncating	2-3	ro	yr	m	5-6	e	d	Eug.																
White Paradise	5-6	obrc	yr	a	3-4	m	k	Scot.																
White Pearmain	7-8	robc	yr	m	5-6	l	dm	Am.																
White Pippin	8-9	ro	wyr	m	8-9	l	dm	Am.																
White Rambo	5-6	oc	yw	m	5-6	m	d	Pa.																
Williams Favorite	5-6	robc	r	m	5-6	e	dm	Mass.																
Willis	7-8	r	wr	s	5-6	e	dmk	N. Y.																
Willow Twig	5-6	roc	yr	m	5-6	vl	m	Va.																
Windsor	5-6	r	yr	m	6	ml	m	Wis.																
Wine, Hays	6-7	ro	yr	m	6-7	l	dm	Del.																
Winecap	5-6	rob	yr	a	7-8	l	dkm	N. J.																
Wolf River	9-10	ro	wr	m	5-6	m	km	Wis.																
Wythe	5-6	oc	wrs	m	5-6	l	dk	Ill.																
Yates	2-3	oc	yrs	m	5-6	vl	m	Ga.																
Yellow Bellflower	8-9	obc	yr	a	7-8	l	dkm	N. J.																
Yellow June	3-4	ro	y	a	5-6	e	dk	Am.																
Yellow Newtown (Albemarle)	8-9	ro	yr	a	10	vl	dkm	N. Y.																
Yellow Transpare- nt	6-7	ro	y	a	7	e	km	Rus.																
Yopp	8-9	rc	gyr	m	5-6	m	dk	Ga.																
York Imperial	8-9	o	yrs	m	5-6	l	dm	Pa.																

Section 2.—APRICOTS. (*Armeniaca vulgaris*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, compressed; co, conical; o, oblate; ob, oblong; r, round. Color: o, orange; r, red; y, yellow. Pit and kernel: b, bitter; c, cling; f, free; i, impervious; p, perrious; s, sweet. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Afr., Africa; Eng., England; Eur., Europe; Fr., France.]

Name.	Description.								Districts and starring.														
	Size.	Form.	Color.	Pit and kernel.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Breda	3-4	ro	o	a	7-8	m	dm	Afr.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Golden.....	2-3	r	o	f	7-8	e	d	N. Y.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hemskirke.....	2-9	ro	or	ib	10	ve	d	Eng.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Large Early.....	5-6	obc	or	bf	7-8	e	d	Fr.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Moorpark.....	8-9	r	or	pb	7-8	m	d	Eng.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Musch.....	3-4	r	yor	a	7-8	e	d	Asia.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Orange.....	5-6	or	or	ca	3-4	e	k	Eur. f.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Peach.....	10	rocc	yo	pb	7-8	m	d	Italy.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Red Masculine.....	2-3	r	yor	b	3-4	e	d	Eur. f.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Royal.....	7-8	roc	yor	i	7-8	ve	d	Fr.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
St. Ambroise.....	8-9	ro	yr	.....	7-8	l	d	Fr. f.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Turkey.....	5-6	r	yo	is	7-8	l	d	Fr. f.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 3.—BLACKBERRIES AND DEWBERRIES. (*Rubus*.)SUBSECTION 1.—BLACKBERRIES. (*R. VILLOSUS*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; o, oblong; ov, oval; r, round. Color: b, black. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late, v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am, America.]

Name.	Description.						Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Agawam	8-9	ro	b	8-9	e	dm	Am.	**	*						*							*
Briton, <i>Ancient</i>	3-4	oov	b	5	m	m	Wis. f	**						*		* *			**			*
Barnard	8-9	oov	b	7-8	m	dm	Ia.	*						*		†						*
Brunton	5-6	o	b	9-10	e	dm	Am.	*						**								*
Dallas							Tex.															*
Dorchester	5-6	oc	b	9-10	ml	km	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Harvest	4-5	ro	b	10	e	dm	Ill.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Erie	8-9	rov	b	5	m	m	Pa.	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kittatinny	9	ro	b	8	ml	d	N. J.	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lawton	9	ov	b	7	m	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Minnewaska	9	ov	b	6	m	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Snyder	5-6	o	b	7	ml	dm	Ind.	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Stone	5	ro	b	7	l	d	Wis. f	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Taylor	7-8	ro	b	8	l	d	Am.	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Triumph, <i>Western</i>	5	oov	b	6	l	d	Am.	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wachusett	5	oov	b	7	e	m	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wilson	10	oov	b	5	m	m	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wilson, Jr.	10	oov	b	5	m	m	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—DEWBERRIES. (*R. CANADENSIS*.)

Name.	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Austin	10	oov	b	5-6	e	dm	Tex.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lucretia	10	oov	b	6	ve	dk	W. Va.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 4.—CHERRIES. (*Cerasus*.)SUBSECTION 1.—HEARTS AND BIGARREAUX. (*C. AVIUM*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, compressed; h, heart shaped; o, oblate; r, round. Color: a, amber; b, black; p, purple; r, red; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Eng., England; Eur., Europe; Fr., France; Ger., Germany; Ont., Ontario; Rus., Russia.]

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Black Heart.....	6-7	hc	b	5-6	ve	dm	Eur. f															
Buttner, <i>Yellow</i>	5-6	r	y	3-4	m	d	Ger.															
Coe <i>Transparent</i>	5-6	r	yr	10	e	d	Conn.															
Downer.....	5-6	rh	r	8-9	m	dm	Mass.															
Eagle, <i>Black</i>	6-7	oh	b	6-7	m	dm	Eng.															
Early Purple <i>Guigne</i>	3-4	rh	pb	6-7	ve	d	l															
Elton.....	8-9	h	yr	9	e	dm	Eng.															
Florence.....	8-9	rh	ar	7-8	l	d	Italy.															
Hovey.....	8-9	h	yr	7-8	l	dm	Mass.															
Knight <i>Early</i>	8-9	oh	b	7-8	e	d	Eng.															
Lewelling.....	8-9	rh	b	8-9		dm	Oreg.															
Mesel.....	10	oh	rb	7-8	m	d	Eur.															
Napoleon (<i>Royal Ann</i>).....	8-9	h	yr	5-6	m	m	Eur.															
Red Jacket.....	8-9	oh	ra	5-6	e	m	Ohio.															
Rockport.....	8-9	oh	ra	8-9	m	dm	Ohio.															
Schmidt.....	9-10	h	r	9-10	ve	dm	Eur.															
Spanish, <i>Yellow</i>	10	oh	yr	10	em	d	Eur.															
Tartarian, <i>Black</i>	10	h	b	10	em	dm	Rus.															
Windsor.....	8	h	yr	7-8	l	dm	Ont.															
Wood, <i>Governor</i>	8-9	rh	yr	7-8	em	dm	Ohio.															

SUBSECTION 2.—DUKE AND MORELLO CHERRIES. (*C. VULGARIS*.)

Archduke.....	8-9	oh	r	7-8	em	dk	Eur.															
Bessarabian.....	5-6	r	r	5	l	k	Rus.															
Carnation.....	8-9	r	yr	4-5	em	k	Eur. f															
Choisy, <i>Belle de</i>	6-7	r	ra	10	e	d	Fr.															
Donna Maria.....	5-6	r	r	4-5	m	k	l															
Dyehouse.....	5-6	ro	r	5-6	ve	k	Ky.															
Eugenie, <i>Empress</i>	7-8	r	ra	8-9	e	d	Fr.															
Hortense, <i>Reine</i>	8-9	rh	r	7-8	ml	dm	Fr.															
Late Duke.....	7-8	oh	r	6-7	l	k	Eng.															
Late Kentish.....	5-6	r	r	4-5	lm	k	Am. f															
Lutovka.....	7-8	r	r	4-5	em	k	Rus.															
Magnifique, <i>Belle</i>	7-8	rh	r	6-7	l	k	Fr.															
Mayduke.....	6-7	rh	r	8-9	e	dk	Fr.															
Montmorency Large.....	7-8	ro	r	7-8	em	km	Fr.															
Montmorency Ord.....	7-8	r	r	7-8	em	km	Fr.															
Morello, <i>Eng. (Wragg)</i>	6-7	rh	rb	5-6	l	km	Eng.															
Olivet.....	7-8	r	r	6-7	e	dk	Fr.															
Philippe, <i>Louis</i>	7-8	r	r	5-6	e	k	Fr.															
Plumstone <i>Morello</i>	8-9	rh	r	5-6	m	k	Am. f															
Richmond.....	5-6	r	r	5-6	e	km	Eur.															
Royal Duke.....	7-8	rh	r	5-6	e	k	Fr. f															

Section 5.—CURRANTS. (*Ribes*.)SUBSECTION 1.—*R. NIGRUM*.

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: r, round. Color: b, black; r, red; w, white. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Eng., England; Eur., Europe; Fr., France; Ont., Ontario.]

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Champion	8-9	r	b	5-6	em	km	Eng.	**									*					*
English.....	5-6	r	b	4-5	m	km	Eng.	**									*					*
Lee.....	8-9	r	b	6-7	m	km	Am.?	**								*	*	*	*	*	*	*
Naples.....	6-7	r	b	6-7	m	km	Eur.	**			*						*					*
Saunders.....	7-8	r	b	6-7	m	km	Ont.	**									*					*
Wales, Prince of.....	7-8	r	b	6-7	m	km	Ont.?	**									*					*

SUBSECTION 2.—*R. RUBRUM*.

Albert, <i>Prince</i>	7-8	r	r	7-8	e	dm	Eur.	**									**					
Cherry	10	r	r	5-6	m	m	Eur.	**			**	*					*					*
Defiance	10	r	r	5-6	m	m	N. Y.	**			*	*					*					*
Fay	10	r	r	4-5	em	km	Eur.	*			*					*	*	*	*	*	*	*
Holland, <i>Long Bunch</i>	5-6	r	r	4-5	m	km	Eng.	*			*					*	*	*	*	*	*	*
London <i>Red</i>	5-6	r	r	8-9	m	dm	Eur.	*			*	*	*			**	**	*	*	*	*	*
Red Dutch	6-7	r	r	7-8	m	km	Eur. ?	*			*					*	*	*	*	*	*	*
Red Grape	5-6	r	r	5-6	m	m	Fr.	**			*					*	*	*	*	*	*	*
Versaillaise	10	r	r	5-6	m	m	Eng.	*			*					*	*	*	*	*	*	*
Victoria	6-7	r	r	5-6	m	m	Eng.	*			*					*	*	*	*	*	*	*
White Dutch	6-7	r	w	10	m	d	Eur.	**			*	*	*			**	*	*	*	*	*	*
White Gondouin	6-7	r	w	10	m	d	Eur.	*			*					*	*	*	*	*	*	*
White Grape	7-8	r	w	8-9	m	m	Eur.	*			*	*	*			**	*	*	*	*	*	*
Wilder	8-9	r	r	7-8	m	m	N. Y.	†			*					*	*	*	*	*	*	*

Section 6.—GOOSEBERRIES. (*Ribes*.)SUBSECTION 1.—*R. GROSSULARIA*.¹

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, oval; r, round. Color: g, green; r, red; w, white; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Eng., England; Ont., Ontario.]

Name	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Chautauqua	8-9	ro	gw	10	m	km	N. Y.	*									*					**
Columbus	8-9	ro	gy	10	m	km	Am. ?	*			*						*					*
Crown Bob	8-9	o	r	7-8	e	km	Eng.	*			*						*					*
Industry	10	ro	r	6-7	e	km	Eng.	*			*					*	*	*	*	*	*	*
Triumph	8-9	ro	gw	7-8	e	mk	Pa. ?	*			*					*	*	*	*	*	*	*
Wellington	8-9	o	gw	5-6	e	mk	Eng.	*			*					*	*	*	*	*	*	*
Whitesmith	8-9	o	g	5-6	e	km	Eng.	*			*					*	*	*	*	*	*	*

SUBSECTION 2.—*R. OXYACANTHOIDES*; *syn. HIRTELLUM*.²

Champion	5-6	ro	gy	5	e	km	Am	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Downing	5-6	r	r	5-6	m	km	N. Y.	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Houghton	2-3	ro	r	10	m	dk	Mass	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pale Red	2-3	ro	r	10	m	dk	Am	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pearl	5-6	r	r	10	m	dk	Ont	*			*					*	*	*	*	*	*	*
Red Jacket	5-6	ro	r	8	e	km	Ont	*			*					*	*	*	*	*	*	*
Smith	5-6	o	yg	9	e	k	Vt	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*

¹ Includes American seedlings of this parentage.² Includes apparent hybrids of this with other species.

Section 7.—GRAPES. (Vitis.)

SUBSECTION 1.—V. *ÆSTIVALIS*.¹

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, oval; r, round. Color: a, amber; b, black; g, green; r, red; w, white; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; m, market; w, wine. Abbreviations of names of places of origin: Am., America; Ont., Ontario.]

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cynthiana.....	2-3	r	b	7-8	e	w	Ark	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Norton Virginia.....	2-3	r	b	5-6	e	w	Va.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—V. *BOURQUINIANA*.¹

Delaware.....	2-3	r	r	10	m	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Elvicaud.....	2-3	r	r	8-9	m	dm	Tex	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Herbement.....	2-3	r	rb	7-8	l	dw	South?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lenoir.....	2-3	r	rb	5-6	l	dm	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Walter.....	5-6	r	r	7-8	ml	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wylie, Peter.....	2-3	r	r	8-9	ve	d	S. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 3.—V. *LABRUSCA*.¹

Agawam.....	8-9	ro	rb	6-7	m	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Barry.....	8-9	r	b	6-7	m	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Brighton.....	7-8	r	r	10	e	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Brilliant.....	5-6	r	r	5-6	e	dm	Tex	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Catawba.....	7-8	r	r	8-9	vl	dm	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Champion.....	5-6	r	b	2-3	ve	m	Am	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Concord.....	6-7	r	b	5-6	m	m	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cottage.....	7-8	r	b	5-6	m	m	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Creveling.....	5-6	ro	b	7-8	em	d	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Diamond, Moore.....	5-6	r	gw	7-8	m	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Diana.....	5-6	ro	r	7-8	m	d	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Duchess.....	4-5	ro	gy	7-8	m	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Elvira.....	2-3	r	w	7-8	m	d	Mo	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Empire State.....	3-4	r	w	7-8	m	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Eumelan.....	5-6	r	b	7-8	m	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Glenfield.....	8-9	r	w	5-6	m	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Goethe.....	10	o	ygr	7-8	l	d	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hartford.....	7-8	r	b	4-5	e	m	Conn	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hayes.....	5-6	r	yw	6-7	e	d	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Herbert.....	7-8	r	b	7-8	e	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Iona.....	5-6	ro	r	10	m	dw	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Isabella.....	7-8	ro	b	7-8	m	dm	S. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ives.....	5-6	ro	b	5-6	e	m	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Janessville.....	5-6	r	b	3-4	e	m	Wis.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Jefferson.....	5-6	r	r	7-8	ml	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lady.....	7-8	r	w	6-7	em	d	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lindley.....	5-6	ro	r	5-6	m	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Martha.....	7-8	r	gy	5-6	m	m	Mo	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Massasoit.....	7-8	r	r	5-6	m	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Merrimac.....	8-9	r	b	7	m	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mills.....	5-6	r	b	10	em	d	Ont.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Moore Early.....	9-10	r	b	5-6	e	m	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Niagara.....	8-9	r	r	5-6	ml	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Olita.....	5-6	r	w	3-4	m	d	Tex	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Perkins.....	7-8	r	r	2-3	ve	m	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pocklington.....	8-9	r	wy	5-6	em	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Prentiss.....	7-8	r	w	7-8	m	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Salem.....	10	r	b	5-6	m	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Telegraph.....	7-8	ro	b	5-6	m	m	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Triumph.....	10	r	y	7-8	vl	d	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ulster.....	5-6	r	a	9-10	m	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Vergennes.....	7-8	o	r	8-9	m	dm	Vt.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Victor, Early.....	5-6	r	b	7-8	ve	dm	Kans	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Washington, Lady.....	5-6	r	yw	6-7	l	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wildor.....	9-10	r	b	7-8	m	m	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Winchell (Green Mountain).....	4-5	r	w	7-8	e	d	Vt.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Woodruff.....	8-9	r	r	4-5	em	m	Mich	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Worden.....	7-8	r	b	7-8	em	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wyoming.....	7-8	r	r	4	m	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

¹Includes apparent hybrids.

Section 7.—GRAPES. (*Vitis*).—Continued.SUBSECTION 4.—*V. LINCEUMII*.

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Flavor.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Carman.....	8-9	r	b	7-8	vl	dm	Tex		*	*	*		*	*	*	*	*	*	*	*	*	*
Jaeger, Hermann....	5-6	r	b	7-8	m	dw	Tex		*	*	*		*	*	*	*	*	*	*	*	*	*

SUBSECTION 5.—*V. ROTUNDIFOLIA*.

Flowers.....	8-9	r	b	4-5	l	dw	South.															
Scuppernong.....	8-9	r	y	5-6	m	w	N. C.															
Tenderpulp.....	8-9	r	b	4-5	m	w	S. C. 1															
Thomas.....	6-7	r	b	5-6	m	w	S. C.															

SUBSECTION 6.—*V. VINIFERA*.¹

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: ov, oval; r, round. Color: a, amber; b, black; p, purple; r, red; w, white; y, yellow. Flavor: m, muscat; a, sweet. Season: e, early; l, late; m, medium; v, very. Use: t, table; w, wine; r, raisin. Abbreviations of names of places of origin: Eur., Europe.]

Alexandria, Muscat of.....	8-9	ov	w	m	l	r	Eur.															
Barbarossa.....	9-10	rov	b	s	vl	t	Eur.		*	*	*	*	*	*	*	*	*	*	*	*	*	*
Black Hamburg.....	9-10	rov	w	s	m	t	Eur.		*	*	*	*	*	*	*	*	*	*	*	*	*	*
Calabrian.....			w	s	l	t	Eur.															
Carminet Medoc.....						w	Eur.															
Golden Champion.....	9-10	ov	a	s	m	t	Eur.															
Colman, Gros.....			p	s	l	t	Eur.		*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cornichon, Red.....						t	Eur.															
Fehér Szagos.....																						
Frontignan, White.....	6-7	r	w	m	m	t	Eur.															
Griosa, Piedmont.....						t																
Malaga.....						t	Eur.															
Olivet Cadinet.....																						
Peru, Rose of.....	8-9	r	b	a	e	t	Eur.															
Prince, Black.....	8-9	ov	b	s	m	t	Eur.															
Quagliano.....																						
Sweetwater (Fon-tainbleu).....	6-7	r	w	s	e	t	Eur.															
Thompson Seedless.....	3-4	o	y	s	e	tr	f.															
Tokay, Flame.....	8-9	r	r	s	m	t	Eur.															
West St. Peter.....			b	s	ve	t	Eur.															
Zinfandel.....			b	s	m	w	Eur.															

SUBSECTION 7.—*V. VULPINA*; *syn. RIPARIA*.²

Berckmans.....	5-6	r	r	10	m	d	S. C.		*	*	*	*	*	*	*	*	*	*	*	*	*	*
Clinton.....	2-3	r	b	5-6	vl	w	N. Y.		*	*	*	*	*	*	*	*	*	*	*	*	*	*
Missouri Reisling.....	5-6	r	gw	7-8	m	w	Mo		*	*	*	*	*	*	*	*	*	*	*	*	*	*
Noah.....	2-3	r	w	5-6	ml	w	Ill.		*	*	*	*	*	*	*	*	*	*	*	*	*	*

¹Includes those heretofore recommended for general cultivation under glass, together with others recommended as adapted to at least portions of Districts 13 and 14 for open-air cultivation, with irrigation.

²Includes apparent hybrids.

Section 8.—MULBERRIES. (*Morus*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, cylindrical; l, long; s, short. Color: b, black. Quality, scale 1 to 10: 1, very poor; 10, best. Season (June): b, beginning. Use: d, dessert; k, kitchen.]

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Downing	5-6	lc	b	8-9	b	dk	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hicks	4-5	sc	b	7-8	b	dk	Ky.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
New American	5-6	lc	b	8-9	b	dk	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Stubbs	10	lc	b	10	.....	d	South.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 9.—NECTARINES AND PEACHES. (*Pernica*.)SUBSECTION 1.—NECTARINES. (*P. VULGARIS* VAR. *LÆVIS*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, compressed; o, oblate; ov, oval, r, round. Color: c, creamy; g, green; r, red; w, white; y, yellow. Adhesion: c, cling; f, free; s, semicling. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Belg., Belgium; Eng., England; Eur., Europe; Fr. France.]

Name.	Description.								Districts and starring.																
	Size.	Form.	Color.		Adhesion.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Boston.....	7-8	rov	yr	y	f	5-6	m	d	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Downton.....	7-8	rov	gr	gr	f	5-6	ve	d	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Newington.....	7-8	rov	gr	gr	c	9-10	e	d	Eng.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Violet.....	7-8	r	yr	wr	f	7-8	ve	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Elruge.....	5-6	rov	gr	g	f	7-8	l	d	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Stanwick.....	6-7	rov	gr	w	f	4-5	l	d	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—PEACHES. (*P. VULGARIS*.)¹

Alexander	5-6	r	wr	cw	s	5-6	ve	dm	Ill.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Allen October	7-8	r	yr	yr	f	5	l	dm	Mo.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Amelia	7-8	r	wr	w	f	7-8	e	dm	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Angel	7-8	r	wr	gw	f	10	e	dm	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Austin	7-8	ov	wr	f	c	5-6	l	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Beers Smock	7-8	ov	yr	yr	f	5-6	l	km	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bellegarde	8-9	r	ygr	gy	f	8-9	m	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bergen Yellow	8-9	r	yr	y	f	8-9	m	d	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bidwell Early	5-6	ov	wr	gw	c	5-6	ve	dk	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bidwell Late	8-9	ov	wr	gw	c	7-8	e	dk	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bilieu	8-9	r	gw	w	f	7-8	vl	dkm	Md.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Blood Cling	9-10	rov	y	yr	c	5-6	vl	k	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Blood Free	8-9	rov	y	yr	f	5-6	vl	k	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cabler Indian	8-9	r	r	r	c	4-5	m	k	Tex.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chair Choice	7-8	r	yr	yr	f	4-5	m	km	Md.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Champion	7-8	r	cr	w	f	10	em	dm	Ill.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chill Hill's	5-6	ovc	yr	yr	f	5-6	me	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chinese Cling	9-10	rc	cwr	wr	c	7-8	m	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Climax	5-6	rov	yw	yw	f	5-6	e	dm	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Columbia	7-8	r	w	y	f	2-3	ml	m	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Coolidge	7-8	r	wr	w	f	7-8	m	dm	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Countess	8-9	r	wr	w	f	6-7	m	dm	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Crosey	5-6	r	yr	y	f	5-6	m	m	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Druid Hill	7-8	r	cr	w	f	8-9	l	dm	Md.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Barnard	5-6	r	yr	y	f	6-7	m	m	Ill.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Chint	5-6	ov	w	w	f	10	ve	dm	Tex.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early Crawford	9-10	rov	yr	yr	f	9-10	m	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Early York	5-6	rov	wr	w	f	8-9	e	dm	Eng.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

¹The distinctive peculiarities of the so-called families or strains of peaches known as Chinese, Persian, and Spanish being more or less ill defined, and mixed by crossing or hybridization, a correct classification of varieties under these heads is not deemed either necessary or practicable.

Section 9.—NECTARINES AND PEACHES. (*Pernica*).—Continued.SUBSECTION 2.—PEACHES. (*P. VULGARIS*).—Continued.

Name.	Description.									Districts and starring.														
	Size.	Form.	Color.		Adhesion.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			Skin.	Flesh.																				
Eaton.....	6-7	r	yr	y	e	5-6	m	dm	N. C.	*						**								
Elberta.....	8-9	rc	yr	y	e	7-8	ml	m	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ferdinand.....	7-8	rov	wr	w	e	8-9	e	dm	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Florida Crawford.....	7-8	ovc	y	y	f	6-7	m	dm	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Foster.....	9-10	r	yr	y	f	9-10	m	dm	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
George IV.....	7-8	r	wr	wr	f	10	m	dk	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Gibbon.....	8-9		w	w	f	6-7	vl	d	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Globe.....	8-9	rov	yr	y	f	6	m	m	Fr. ?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Grosse Mignonne.....	8-9	r	cr	w	f	10	em	d	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hale.....	4-5	r	gwr	gw	s	5-6	e	m	Md.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Heath <i>Cling</i>	10	rov	wr	w	e	10	vl	km	Md.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Honey.....	4-5	ov	cr	wr	f	8-9		dk	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hoover.....							vl																	
Imperial.....	9-10	r	yr	w	f	8-9		dk	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kenrick <i>Heath</i>	9-10	ov	wr	gw	f	4-5	l	m	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kerr, <i>Jessie</i>	7-8	ov	wr	w	f	5-6	ve	m	Md.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Keyport.....	7-8	rov	wr	w	f	4-5	l	m	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Large York.....	6-7	r	cr	w	f	7-8	e	dm	N. Y. ?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Late Admirable.....	10	rov	gr	w	f	10	m	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Late Crawford.....	10	r	yr	y	f	10	l	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Late Rarieripe.....	8-9	rov	yr	w	f	10	m	dm	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lee, <i>General</i>	9-10	ro	g	g	e	8	e	m	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lemon <i>Cling</i>	9-10	rov	yr	y	e	10	m	dm	S. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Leopold.....	8-9	r	yr	y	f	7-8	m	dm	Belg.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Louise.....	5-6	r	r	w	f	7-8	e	dm	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Maggie <i>Burt</i>	7-8	ov	w	w	e	9	ve	dm	Tex.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Morris White.....	7-8	ov	cw	w	f	5-6	m	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mountain Rose.....	7-8	r	wr	w	f	7-8	em	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Oldmixon <i>Cling</i>	7-8	rov	e	w	e	10	m	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Oldmixon Free.....	7-8	rov	e	w	f	8-9	m	dm	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Onderdonk.....	7-8	ov	w	w	f	10	m	dm	Tex.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pallas.....	7-8	ov	w	w	f	6-7	e	dm	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Parham.....	5-6	r	yw	wr	f	5-6	l	mk	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Peen to.....	5-6	f	w	w	e	7-8	e	d	China.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Picquet.....	7-8	r	yr	y	f	5-6	l	d	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
President.....	7-8	rov	yr	w	f	5-6	m	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Red Cheek <i>Melo-</i> <i>coton</i>	7-8	rov	yr	y	f	5-6	m	dm	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Reeves <i>Favorite</i>	7-8	rov	yr	y	f	5-6	m	m	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Richmond.....	8-9	r	yr	y	f	6-7	m	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rivers.....	7-8	rc	cw	w	f	7-8	e	dm	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Royal George.....	5-6	r	wr	w	f	10	m	d	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Salway.....	7-8	rov	yr	y	f	5-6	l	m	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Smock.....	7-8	ov	yr	y	f	5-6	l	m	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sneed.....	6-7	ov	gw	w	e	6-7	ve	m	Tenn.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Snow.....	7-8	r	w	w	f	6-7	m	dm	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Snow Orange.....	5-6	r	yr	y	f	5-6	m	m	Mich.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Stevens <i>Rarieripe</i>	5-6	rov	cw	w	f	6-7	ml	m	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
St. John.....	7-8	r	yr	y	f	5-6	e	m	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Strawberry.....	5-6	ov	r	w	f	7-8	em	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Stump.....	10	rov	wr	w	f	5-6	ml	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Susquehanna.....	7-8	r	yr	y	f	9-10	m	dk	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Thurber.....	7-8	rov	wr	w	f	7-8	e	d	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tillotson.....	5-6	r	wr	w	f	7-8	e	d	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tippecanoe.....	10	r	yr	y	c	6-7	l	dm	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wager.....	5-6	ov	y	y	f	4-5	m	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Waldo.....	4-5	ov	w	w	f	6-7	e	dm	Fla.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ward <i>Late</i>	7-8	rov	wr	w	f	7-8	vl	dk	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Waterloo.....	5-6	r	wr	gw	s	5-6	ve	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wheatland.....	9-10	r	yr	y	f	6-7	m	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Yellow Rarieripe.....	7-8	r	yr	y	f	7-8	m	dm	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 10.—PEARS. (*Pyrus communis* and *sinensis*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: i, irregular; o, oblate; ob, oblong; obo, obovate; obt, obtuse; ov, ovate; p, pyriform; r, round; t, turbinate. Color: b, brown; c, crimson; g, green; r, red; ru, russet; y, yellow. Texture: b, buttery; f, firm; g, granular; m, melting; t, tender. Flavor: a, acid; aa, astringent; j, juicy; s, sweet; v, vinous; p, perfumed. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Belg., Belgium; Eng., England; Eur., Europe; Flem., Flemish Provinces; Fr., France; Hol., Holland.]

Name.	Description.									Districts and starring.															
	Size.	Form.	Color.	Texture.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Abbot	5-6	obobop	yeru	bm	sp	6-7	e	d	R. I.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Amanlis, <i>Beurre</i>	7-8	obol	yrbru	bm	jp	4-5	e	m	Belg.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ananas d'Ete	6-7	p	ybru	bm	sp	5-6	e	m	Hol.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Andrews	6-7	pi	ygr	m	v	4-5	e	d	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Angouleme, <i>Duchess de</i>	10	obobo	gyru	b	v	5-9	m	dm	Fr.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Anjou	7-8	obtp	gre	m	vp	8-9	m	dm	Fr.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Ansault	4-5	rob	gyru	m	av	4-5	e	m	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Archangel	8-9	obop	yrn	bm	jp	4-5	m	m	Fr.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Bartlett	8-9	obobtp	yrur	bt	jvp	6-7	em	m	Eng.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Bergen	8-9	obtp	yc	bm	jap	4-5	m	m	N. Y.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Bessamianka	5-6	oobo	y	g	js	4-5	e	d	Rus.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bilboa	5-6	obop	yr	bm	v	5-6	e	d	Spain	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bloodgood	4-5	tobo	yr	bm	sp	5-6	e	d	N. Y.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Bordeaux, <i>Duchess de</i>	5-6	rop	yr	bm	js	4-5	l	m	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bosc	8-9	p	yrur	mb	p	10	m	dm	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Bonsack	7-8	obop	yr	bm	jp	5-6	m	m	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Brandywine	5-6	p	ygru	m	jvp	4-5	e	m	Pa.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Brignais (<i>Des Nonnes</i>)	5-6	ro	g	m	jp	5-6	e	dm	Eur.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
British Queen	7-8	obop	ruc	bm	s	6-7	ml	d	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Buffum	5-6	obobo	yr	b	av	5-6	em	m	R. I.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Catillac	10	t	yhr	f	as	2-3	vl	k	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chambers	4-5	rob	yr	gf	s	4-5	ve	d	Md.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chairgeau	7-8	p	yc	bg	jap	4-5	l	m	Fr.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Clapp Favorite	8-9	obop	yc	bm	jap	6-7	e	dm	Mass	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Columbia	8-9	obo	y	m	jap	4-5	l	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Comice, <i>Doyenne du</i>	8-9	rp	yc	mb	jap	8-9	ml	dm	Fr.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dana Hovey	3-4	obop	yr	m	jap	10	l	d	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Diel	8-9	obop	yr	gb	av	5-6	m	d	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Dix	7-8	obp	yr	m	jap	8-9	m	d	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Dumas, <i>Belle Epine</i>	5-6	obop	gyru	bm	js	5-6	ml	d	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Easter <i>Beurre</i>	7-8	robo	ygru	bm	js	5-6	vl	d	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Elizabeth, <i>Manring</i>	4-5	obop	yr	m	jap	6-7	e	d	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Flemish Beauty	8-9	obo	yrur	m	jap	5-6	em	m	Belg.?	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Fontenay, <i>Jalousie de</i>	5-6	obobop	ygrur	bm	rich	5-6	m	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Foster Seckel	3-4	obp	yr	m	jvp	10	e	dm	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fredk. Clapp	6-7	rp	y	m	jvp	5-6	m	dm	Mass	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fulton	4-5	ro	ru	b	j	5-6	ml	dk	Me	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Garber	7-8	robt	yr	m	j	3-4	ml	km	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ghislain	5-6	p	y	b	jrich	4-5	m	d	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Giffard	5-6	p	gyr	m	jvp	6-7	e	dm	Fr.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Glout Morceau	6-7	obop	gyb	bm	rich	4-5	l	d	Flem	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Goodale	7-8	obp	yeru	ng	avp	5-6	m	dm	Me	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Goubalt	3-4	obo	gy	m	j	3-4	em	km	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Gray Doyenne	3-4	ovobo	ru	bm	rich	10	m	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hardy, <i>Beurre</i>	7-8	obop	gyru	bm	jv	10	m	m	Eur.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Henkel	7-8	obtp	gyru	m	v	8-9	e	dk	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Heyat, <i>Emile d'Hosenschenck</i>	8-9	obp	yr	m	avp	8-9	ml	d	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Hosenschenck	5-6	ro	yg	gm	jv	4-5	e	dm	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Howell	6-7	rp	yr	m	jv	5-6	m	dm	Conn	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Jaminiotte	7-8	obo	grab	gb	js	4-5	l	km	Fr.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Jodoigne, <i>Triomphe de</i>	8-9	obop	yeru	gm	js	4-5	m	mk	Belg.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Julienne	3-4	obo	y	fb	aj	var	e	m	Am.?	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kleffer	7-8	rov	yr	gm	js	3-4	ml	mk	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kingessing	7-8	obp	gy	gb	jap	4-5	e	km	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kirtland	4-5	obtobo	yrur	m	jap	5-6	e	d	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Knight	5-6	op	yg	m	js	3-4	m	k	R. I.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Langelier	5-6	obop	yeru	ng	v	5-6	l	d	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lawrence	5-6	obop	yr	m	sp	7-8	l	dm	N. Y.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
Le Conte	7-8	robt	yr	m	s	3-4	e	m	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Louise, <i>Bonne de Jersey</i>	7-8	obp	gbr	m	j	4-5	m	m	Fr.	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

Section 10.—PEARS. (*Pyrus communis* and *sinensis*).—Continued.

Name.	Size.	Description.							Districts and starring.															
		Form.	Color.	Texture.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Lucrative	5-6	obop	ygru	m	s	8-9	e	dm	Flem	***				*		*	*	*			*		*	
McLaughlin	7-8	obtp	yru	m	jap	4-5	l	dk	Me	*	*	*	*											
Madeleine	5-6	obop	ygb	m	ap	4-5	e	d	Fr	*	*	*	*											
Malines, Josephine de	5-6	rop	gyru	m	jap	5-6	l	dm	Belg	*	*	*	*			*	*	*	*			*		*
Marguerite, Petite	4-5	obtp	ybru	bm	jsh	5-6	e	d	Fr	*	*	*	*			*	*	*	*			*		*
Marie Louise	6-7	obp	gyru	bm	jvas	5-6	m	dk	Belg	*	*	*	*			*	*	*	*			*		*
Merriam	5-6	ro	yru	gm	jvp	4-5	m	dm	Mass	*	*	*	*			*	*	*	*			*		*
Mount Vernon	6-7	obtp	yrur	gm	jvp	5-6	ml	dm	Mass	*	*	*	*			*	*	*	*			*		*
Moyamensing	5-6	ro	yr	gm	js	3-4	e	dm	Pa	*	*	*	*			*	*	*	*			*		*
Napoleon	6-7	obtp	gy	m	js	3-4	e	km	Belg	*	*	*	*			*	*	*	*			*		*
Onondaga	7-8	obtp	yru	bmj	jv	4-5	ml	km	Conn	*	*	*	*			*	*	*	*			*		*
Osband Summer	3-4	obop	y	m	jap	5-6	ve	dm	N. Y.	*	*	*	*			*	*	*	*			*		*
Ott	3-4	robo	gyru	m	ap	4-5	e	dm	Pa	*	*	*	*			*	*	*	*			*		*
Paradise d'Automne	7-8	obp	yru	gm	jvp	5-6	m	dk	Belg	*	*	*	*			*	*	*	*			*		*
Passé Colmar	6-7	obop	yru	b	jap	4-5	l	km	Belg	*	*	*	*			*	*	*	*			*		*
Pound	8-9	p	ygb	fg	v	2-3	vl	k	Eur	*	*	*	*			*	*	*	*			*		*
Pratt	5-6	obtp	gyru	m	jva	4-5	e	mk	R. I.	*	*	*	*			*	*	*	*			*		*
Quimper, Suzanne de	5-6	rp	gru	m	jap	4-5	e	d	Belg	*	*	*	*			*	*	*	*			*		*
Reeder	4-5	robt	gru	mbg	avp	8-9	l	dm	N. Y.	*	*	*	*			*	*	*	*			*		*
Rostiezer	3-4	obop	yrb	mb	avp	10	e	d	Eur	*	*	*	*			*	*	*	*			*		*
Rutter	6-7	rp	gyru	gm	av	5-6	ml	dm	Pa	*	*	*	*			*	*	*	*			*		*
Seckel	3-4	obo	bgru	bm	jp	10	m	dm	Pa	*	*	*	*			*	*	*	*			*		*
Sheldon	5-6	robo	gyru	m	javp	5-6	ml	dm	N. Y.	*****						*****								
Souvenir du Congress	9-10	obobtp	yr	bt	jvp	5-6	e	m	Fr	*	*	*	*			*	*	*	*			*		*
Sterling	5-6	rop	yru	b	js	4-5	e	dm	N. Y.	*	*	*	*			*	*	*	*			*		*
Stevens	7-8	r	y	b	ap	4-5	e	d	N. Y.	*	*	*	*			*	*	*	*			*		*
Summer Boyenne	2-3	robo	yr	m	js	4-5	ve	d	Belg	*****						*	*	*	*			*		*
Superfin	5-6	rp	yru	bm	v	7-8	m	dkm	Fr	*	*	*	*			*	*	*	*			*		*
Treyve	5-6	obop	yrur	m	jap	5-6	em	d	Fr	*	*	*	*			*	*	*	*			*		*
Tyson	4-5	p	yru	m	jap	7-8	e	dm	Pa	*	*	*	*			*	*	*	*			*		*
Urbaniste	5-6	obop	yru	bm	jp	8-9	ml	d	Belg	*	*	*	*			*	*	*	*			*		*
Vicar	7-8	p	ygb	b	jv	4-5	l	km	Fr	*	*	*	*			*	*	*	*			*		*
Washington	5-6	ovobo	yr	m	js	5-6	e	d	Del.	*	*	*	*			*	*	*	*			*		*
White Doyenne	6-7	obo	yr	bm	jv	10	m	dm	Fr	*	*	*	*			*	*	*	*			*		*
Winter Nelis	4-5	robo	yru	bm	jap	10	l	dm	Belg	*	*	*	*			*	*	*	*			*		*

Section 11.—PLUMS. (*Prunus*.)

SUBSECTION 1.—P. AMERICANA.

[Key.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, compressed; f, flattened; o, oval; ob, obovate; obl, oblong; r, round. Color: b, black; br, brown; g, green; p, purple; r, red; v, violet; w, white; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Belg., Belgium; Eng., England; Eur., Europe; Fr., France; Ger., Germany; Jap., Japan; Ont., Ontario; Rus., Russia.]

Name.	Description.							Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Cheney.....	3-4	o	r	5	m	km	Wis.										*						
De Soto.....	5-6	ro	yr	5-6	m	km	Wis.										*						
Downing, Charles.....	6-7	ro	r	5-6	me	m	la.										*						
Forest Garden.....	5-6	r	r	5	em	k	la.										*						
Hawkeye.....	5-6	r	r	6-7	ml	km	la.										*						
Rockford.....	5-6	ro	yr	8-9	m	d	la.										*						
Rollingstone.....	6-7	ro	r	6-7	m	dk	Minn.										*						
Weaver.....	5-6	oe	r	2-3	m	km	la.										*						
Wolf.....	6-7	ro	r	2-3	m	km	la.										*						
Wyant.....	4-5	ro	yr	2-3	m	k	la.										*						

Section 11.—PLUMS. (*Prunus*).—Continued.SUBSECTION 2.—*P. ANGUSTIFOLIA*.

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Caddo Chief	5-6	o	r	6	ve	dm	La.							*								*
El Paso					vi		Tex.							**								
Lone Star	2-3	o	r	3	m	k	Tex.							**								*
Newman	5-6	o	r	3-4	m	km	Ky.				*	*	*	*	*	*						
Paris Belle					m		Tex.							**								
Pottawattamie	5-6	r	r	3-4	ml	km	Tenn.						*		*							
Transparent, Yellow.	7-8	o	y	5-6	e	km	Tex.							**								

SUBSECTION 3.—*P. CERASIFERA*.¹

Caradenc, <i>De</i>	5-6	r	dr	3-4	e	k	S. C.						*	*								
Marianna	4-5	r	r	2-4	l	k	Tex.								*							
Pissard	5-6	r	r	2-3	l	k	l.						*	*	*							

SUBSECTION 4.—*P. DOMESTICA*.

Agén, <i>Prune d'</i>	5-6	o	vp	10	m	dm	Fr.														**	**
Archduke	7-8	ro	b	3-4	e	km	Eur.	*														
Arctic, <i>Moore</i>	4-5	ro	b	5	e	dk	Me.†	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Aubert, <i>Yellow</i>	8-9	o	y	7	e	km	Eur.	*														
Bavay (<i>Bavay Green</i> <i>Gage</i>)	5-6	r	y	10	m	dm	Belg.	**														*
Bleeker <i>Gage</i>	5-6	ro	y	5-6	em	dm	N. Y.	*						*	*	*	*	*	*	*	*	*
Bradshaw	7-8	oob	rp	4-6	e	dm	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Clyman	6-7	or	bv	7-8	ve	dm	Cal.	*						*	*	*	*	*	*	*	*	*
Columbia	9-10	r	brp	8-9	e	dk	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Copper	4-5	o	yr	3-4	em	k	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Danson	3-4	o	p	3-4	l	km	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Dennistoun <i>Superb</i>	7-8	r	yg	10	em	dm	N. Y.	*						*	*	*	*	*	*	*	*	*
Diamond, <i>Black</i>	7-8	o	p	4-5	m	km	Am.	*						*	*	*	*	*	*	*	*	*
Domine Dull	5-6	o	p	3-4	u	km	N. Y.†	*						*	*	*	*	*	*	*	*	*
Drap d'Or	4-5	r	y	4-6	e	d	Eur.†	*						*	*	*	*	*	*	*	*	*
Duane <i>Purple</i>	10	o	rp	3-4	em	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Emigrant	8-9	o	p	3-4	m	km	Kans.†	*						*	*	*	*	*	*	*	*	*
Engelbert	8-4	ro	b	3-4	em	km	Belg.	*						*	*	*	*	*	*	*	*	*
German <i>Prune</i>	6-7	o	p	4-6	m	km	Ger.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Golden Drop, <i>Cos</i>	7-8	o	yr	5-6	m	km	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Grand Duke	9-10	o	b	5-6	ml	km	Eur.†	*						*	*	*	*	*	*	*	*	*
Hand (<i>General Hand</i>)	10	o	y	3-4	m	m	Pa.†	*						*	*	*	*	*	*	*	*	*
Hudson River <i>Purple Egg</i>	9-10	o	rp	7-8	m	dm	N. Y.†	*						*	*	*	*	*	*	*	*	*
Hullings <i>Superb</i>	10	ro	gy	3-4	em	k	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Imperial <i>Gage</i>	6-7	o	gy	10	m	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Italian (<i>Fellenburg</i>)	5-6	o	b	3-4	l	mk	Eur.†	*						*	*	*	*	*	*	*	*	*
Jefferson	8-9	o	yp	10	e	dk	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kingston	9-10	o	b	4	m	km	Am.†	*						*	*	*	*	*	*	*	*	*
Kirke	5-6	robl	p	4-6	m	m	Eng.	*						*	*	*	*	*	*	*	*	*
Lawrence <i>Favorite</i>	8-9	r	yg	10	e	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lombard	5-6	ro	vr	3-4	e	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
McLaughlin	8-9	r	yr	10	e	dm	Me.	**						*	*	*	*	*	*	*	*	*
Moldavia	7-8	o	y	6-7	e	m	Rus.	*						*	*	*	*	*	*	*	*	*
Monroe <i>Egg</i>	5-7	o	gy	3-4	m	m	N. Y.	*						*	*	*	*	*	*	*	*	*
Orleans	5-6	ro	rp	3-4	e	m	Eng.	*						*	*	*	*	*	*	*	*	*
Ottoman	6-6	ro	rp	4-6	e	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Peach	10	rf	brr	3-4	ve	k	Am.†	*						*	*	*	*	*	*	*	*	*
Pond (<i>Ponthill, Hungarian Prune</i>)	10	o	yr	4-5	m	m	Eng.	*						*	*	*	*	*	*	*	*	*
Prince <i>Yellow</i>	6-7	o	y	5-6	e	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Purple <i>Favorite</i>	6-7	rob	brp	10	e	dm	Am.†	*						*	*	*	*	*	*	*	*	*
Purple <i>Gage</i>	6-6	rf	vy	5-6	m	dk	Eur.	*						*	*	*	*	*	*	*	*	*
Quackenboss	8-9	obl	p	3-4	m	m	N. Y.	*						*	*	*	*	*	*	*	*	*
Richland	5-6	o	rp	5-6	e	km	Pa.	*						*	*	*	*	*	*	*	*	*
Royale <i>Hative</i>	5-6	r	pbr	5-6	e	k	Fr.	*						*	*	*	*	*	*	*	*	*
Saratoga	5-6	ro	rp	4	e	m	N. Y.	*						*	*	*	*	*	*	*	*	*
Saunders	8-9	ro	gy	4-5	m	km	Ont.	**						*	*	*	*	*	*	*	*	*
Shropshire	3-4	ob	pb	3-4	m	k	Eng.	*						*	*	*	*	*	*	*	*	*
St. Catharine	5-6	ob	y	5-6	m	dk	Fr.	*						*	*	*	*	*	*	*	*	*

¹ Includes supposed hybrids.

Section 11.—PLUMS. (*Prunus*).—Continued.SUBSECTION 4.—*P. DOMESTICA*.—Continued.

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sharp Emperor	8-9	ro	ylp	3-4	ml	km	Eng.	*														
Smith Orleans	8-9	o	rp	4-6	e	m	N. Y.	*														
Tours, <i>Royale de</i>	8-9	r	vr	4-5	m	dk	Fr.	*							*							
Transparent Gage	6-7	rf	gyr	8-9	m	dk	Fr.	*						*								
Wales, <i>Prince of</i>	8-9	robl	rp	10	m	m	Eng.	*														
Wangenheim	5-6	o	p	4-5	e	m	Ger.								†							
Washington	10	ro	yc	4-5	em	dm	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Yellow Egg	8-9	o	y	3-4	e	km	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 5.—*P. HORTULANA*.

Clinton	7-8	r	r	.....	m	k	?							*	*							
Cumberland	5-6	r	y	4-5	l	km	Ga.			*	*			*	*							
Golden Beauty	4-5	ro	y	4-5	ml	km	Tex.							*	*							
Indian Chief	6-7	r	r	8	l	km	Tex.							*	*							
Kanawha (<i>Peach</i> <i>leaved</i>)	6-7	r	r	.....	l	k	Ga. (?)							*	*							
Miner	5-6	r	r	5-6	ml	km	Tenn.							*	*							
Wild Goose	3-4	r	p	4-5	l	km	Tenn.			*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 6.—*P. TRIFLORA*.

Abundance (<i>Botan</i>) ..	6-7	ro	brr	4-5	em	m	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Babcock	7-8	r	r	5-6	m	dm	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Botan White	5-6	r	p	4-5	m	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Burbank	6-7	r	py	4-5	ml	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Chabot	5-6	ro	rp	5	em	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Excelsior	5-6	r	rp	6-7	e	dm	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Georgeson (<i>Hattan-</i> <i>kio 1</i>)	7-8	o	y	5-6	e	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kelsey	10	ro	yr	4-5	e	m	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kerr (<i>Hattankio 2</i>) ..	5-6	o	y	4-5	m	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Long Fruit	7-8	r	r	7	e	dm	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Normand .....	.....	r	r	9	ve	.....	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ogon	6-7	r	y	3-4	e	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Red June	5-6	ov	r	4-5	ve	.....	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Red Nagate	5-6	ro	r	5-6	m	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Satsuma	6-7	r	p	7-8	ml	km	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Willard	3-4	ro	r	2-3	m	m	Jap.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Yellow Japan	5-6	r	py	4-5	l	.....	.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 12.—QUINCES. (*Cydonia vulgaris*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, oblate; ob, obtuse; p, pyriform; r, roundish. Color: g, greenish; o, orange; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late. Use: k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Fr., France; Ont., Ontario; Port, Portugal.]

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Angers	8-9	obp	y	8-9	m	km	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Champlon	6-7	obp	gy	9-10	m	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Meech	7-8	ro	oy	6-7	m	km	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Missouri <i>Mammoth</i> ..	10	ro	oy	10	e	km	Mass.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Orange (<i>Apple</i>)	8-9	ro	oy	10	e	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pear	8-9	p	oy	10	em	km	Am.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Portugal	10	obp	y	.....	e	km	Port.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Rea	8-9	rob	py	7-8	e	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 13.—RASPBERRIES. (*Rubus*.)SUBSECTION 1.—*R. IDÆUS*.¹

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; o, obtuse; r, roundish. Color: b, black; c, crimson; p, purple; r, red; s, scarlet; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Eng., England; Eur., Europe; Fr., France; Ont., Ontario.]

Name.	Description.						Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Clarke.....	7-8	c	c	7-8	e	d	Conn	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cluster, <i>Early</i>	10	ro	pr	7-8	e	d	Oreg.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fastolf.....	10	ro	pr	7-8	e	d	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Fontenoy, <i>Belle de</i>	8-9	c	c	5-6	l	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Franconia.....	8-9	oc	pr	5-6	m	dm	Fr. (1)	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
French.....	7-8	oc	c	5-6	m	dm	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Herstine.....	7-8	re	c	7-8	m	d	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hornet.....	10	c	c	5-6	m	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hudson River <i>Antwerp</i>	8-9	c	r	4-5	m	m	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Knevet <i>Giant</i>	10	oc	r	7-8	m	dm	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
October Red (Four Seasons).....	5-6	rob	c	5-6	l	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Orange (Brinckle's Orange).....	10	re	y	10	m	d	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pallnau.....	10	oc	c	5-6	m	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Red Antwerp.....	7-8	roc	r	5-6	m	d	Eng.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Souchetti.....	6-7	c	y	4-5	m	d	Fr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—*R. NEGLECTUS*.

Caroline.....	5-6	ro	y	3-4	e	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Columbian.....	9-10	r	p	6-7	e	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Philadelphia.....	4-5	r	p	4-5	em	km	Pa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Purple Cane.....	4-5	r	p	4-5	em	k	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Reliance.....	5-6	ro	p	5-6	m	km	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Shaffer.....	8-9	r	p	6-7	m	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 3.—*R. OCCIDENTALIS*.

Cromwell.....	5-6	r	b	5-6	e	km	Conn	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Doolittle.....	5-6	r	b	5-6	e	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Earhart.....	4-5	r	b	5-6	el	k	Conn	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Eureka (Mohler).....	6-7	r	b	5-6	em	km	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Gregg.....	7-8	ro	b	4-5	m	m	Ind	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hilborn.....	7-8	ro	b	6-7	e	dm	Ont	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Johnston.....	4-5	r	b	5-6	m	km	Ark	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Kansas.....	6-7	r	b	5-6	m	km	Kans	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lotta.....	6-7	r	b	5-6	m	km	Kans	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
McCormick (Maine Cluster).....	5-6	r	b	5-6	m	km	Ind	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Miami.....	5-6	r	b	6-7	m	km	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Nemaha.....	7-8	ro	b	5-6	e	m	Nebr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ohio.....	5-6	r	b	4-5	e	km	Am	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Older.....	5-6	r	b	5-6	em	km	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Palmer.....	4-5	r	b	5-6	e	km	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Smith Protific.....	5-6	r	b	5-6	e	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Souhegan.....	4-5	r	b	5-6	m	km	N. H.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Tyler.....	4-5	r	b	5-6	em	km	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 4.—*R. STRIGOSUS*.

Brandywine.....	5-6	ro	r	5-6	e	km	Del.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cuthbert.....	7-8	ro	r	4-5	m	nu	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Golden Queen.....	7-8	ro	y	6-7	m	dk	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hansell.....	5-6	r	r	5-6	e	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Louden.....	6-7	ro	r	5-6	m	dm	Wis.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Marlboro.....	7-8	r	r	4-5	m	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Superb.....	8-9	r	p	5-6	m	e	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Thwack.....	7-8	r	pr	4-5	m	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Turner.....	4-5	ro	r	7-8	m	dm	Ill.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

¹ Includes possible hybrids.² Named for Fontenoy, a village of Belgium.

Section 14.—STRAWBERRIES. (*Fragaria*.)

[KEY.—Sex: b, bisexual; p, pistillate. Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; co, compressed; l, long; o, oblate, ob, oblong; ov, ovate; r, roundish. Color: c, crimson; d, dark; l, light; r, red; s, scarlet. Quality, scale 1 to 10: 1, very poor; 10, best. Season: s, early; m, medium; l, late. Use: d, dessert; m, market. Abbreviations of names of places of origin: Am., America; Can., Canada; Ont., Ontario.]

Names.	Description.								Districts and starring.														
	Sex.	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bidwell	b	10	lc	dc	8-9	m	dm	Mich	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Bubach No. 5	p	10	rob	s	5-6	e	m	Ill	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Champion	p	6-7	rc	s	5-6	e	m	Pa	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Crawford	b	7-8	rc	lc	9	m	dm	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Crescent	p	5-6	rc	bs	4-5	e	m	Conn	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cumberland	b	10	ro	bs	5-6	e	m	Pa	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Downing, Charles	b	6-7	c	ds	6-7	m	dm	Ky	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Enhance	b	7-8	c	bs	7-8	m	dm	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Eureka	p	6-7	r	br	5-6	m	dm	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Gandy	b	7-8	c	lc	7-8	m	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Greenville	p	7-8	roc	bs	7-8	e	dm	Ohio	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Haverland	p	6-7	oco	s	7-8	m	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hoffman	b	5-6	c	dc	7-8	m	dm	S. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Jersey Queen	p	8-9	rc	bs	6-7	m	d	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Jessie	b	9-10	rc	bs	5-6	m	dm	Wis	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Manchester	p	7-8	oc	s	7-8	ml	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Michel Early	b	5-6	oc	r	7-8	e	m	Ark	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Miner	b	10	c	c	5-6	m	dm	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Monarch of West	b	10	roc	br	5-6	m	dm	Ill	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Mount Vernon	b	8-9	roc	ls	5-6	m	dm	Am	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Neunan	p	7-8	c	ls	4-5	m	m	S. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Parker Earle	b	6-7	lc	br	6-7	m	dm	Tex	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Pearl	b	5-6	oc	dr	5-6	m	m	South	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Piper	b	7-8	c	c	5-6	e	m	Ill	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sandoval	b	7-8	roc	dc	8-9	e	m	Ill	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Saunders	b	6-7	c	c	7-8	e	dm	Ont	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sharpless	b	8-9	oco	br	8-9	m	dm	Pa	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Thompson, Lady	b	7-8	ov	c	5-6	e	dm	N. C.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Van Deman	b	5-6	oc	s	7-8	m	d	Ark	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Vick	b	4-5	r	bs	6-7	m	dm	Mo	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Warfield	p	5-6	c	dr	7-8	e	m	Ill	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Williams	b	6-7	rc	dc	9	e	dm	Can	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wilson	b	5-6	c	dc	7-8	em	m	N. Y.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wood, Beder	b	4-5	rc	ls	5-6	m	dm	Ill	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Woolverton	b	5-6	c	dc	7-8	m	dm	Ont	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 15.—NUTS.

SUBSECTION 1.—ALMONDS. (*AMYGDALUS COMMUNIS*.)

[KEY.—Size: l, large; m, medium; s, small. Form: b, broad; l, long; v, very. Flavor: s, sweet. Shell: s, soft; t, thin; v, very. Abbreviation of name of place of origin: Eur., Europe.]

Name.	Description.				Origin.	Districts and starring.														
	Size.	Form.	Flavor.	Shell.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Blowers					Cal														*	*
Brier	m		s	s	Cal														*	*
Drake	l		s	t	Cal														*	*
Golden State	lm	l	s	s	Cal														*	*
Harriott	lm	l	s	s	Cal														*	*
IXL	l	lb	s	s	Cal														*	*
King Soft Shell				vst	Cal														*	*
Languedoc	l		s	t	Eur														*	*
Lewelling	l		s	s	Cal														*	*
McCoy	ms				Cal														*	*
Ne Plus Ultra	l	vl	s	s	Cal														*	*
Nonpareil (Extra)	l	b	s	vt	Cal														*	*
Paper Shell	m		s	s	Cal														*	*
Routier New	l		s	s	Cal														*	*
Soft Shell, Routier	l		s	s	Cal														*	*
Supremo	l		s	vt	Cal														*	*
Tarragona	l	b	s	s	Eur														*	*
Twin, Routier	l			s	Cal														*	*

Section 15.—NUTS—Continued.

SUBSECTION 2.—CHESTNUTS. (*CASTANEA*.)

[KEY.—Size: l, large; m, medium; v, very. Quality: b, best; g, good; v, very. Abbreviation of name of place of origin: Eur., Europe.]

Name.	Description.				Districts and starring.														
	Size.	Qual- ity.	Species.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Advance	vl	g	japonica	N. J.			*												
Alpha	vl	g	japonica	N. J.			*												
Beta	l		japonica	N. J.			*												
Combale, Marron	l	g	sativa	Eur.														*	
Comfort	l	g	sativa	Pa			†	*											
Cooper	vl	vg	sativa	N. J.			*												
Corson	vl	g	sativa	Pa			*												
Dager	l	vg	sativa	Del.			*												
De Lyon	vl	g	sativa	Eur.			*												*
Felton	m	vg	japonica	Del.			*												
Giant, Japan	vl	g†	japonica	N. J.			*												
Hannum (Styer)	ml		sativa	Pa			*												
Hathaway	m	b	dentata	Mich.			*												
Killen	vl	g	japonica	Del.			*												
Moncur	m	vg	sativa	Del.			*												
Murrell	m	vg	dentata	Va			*												
Numbo	l	g	sativa	Pa			*												
Paragon	l	g	sativa	Pa			*												
Parsons	l		japonica	N. Y.			*												
Phillips	l	vg	dentata	N. J.			*												
Reliance	l	g	japonica	N. J.			*												
Ridgely	l	g	sativa	Del.			†	*											
Scott	m		sativa	N. J.			*												
Success	vl	vg	japonica	N. J.			*												
Superb	l		japonica	N. J.			*												

SUBSECTION 3.—FILBERTS AND HAZELNUTS. (*CORYLUS AVELLANA*.)

[KEY.—Size: l, large; m, medium. Form: ob, oblong; ov, oval; r, round. Quality: g, good. Ab-
breviation of name of place of origin: Eur., Europe.]

Name.	Description.				Districts and starring.														
	Size.	Form.	Quality.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Du Chilly	l			Eur.														*	
Jones		ov	g	Del.			*												
Lambert	l	ob		Eur.			*											*	
Piedmont	m	r		Eur.			*											*	
Purple Leaf	l			Eur.			*											*	

SUBSECTION 4.—PECANS. (*HICORIA PEOCAN*.)

[KEY.—Size: l, large; m, medium; s, small. Form: c, cylindrical; l, long; ob, oblong; ov, oval;
r, round. Quality: g, good; v, very.]

Name.	Description.				Districts and starring.														
	Size.	Form.	Quality.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Columbian	l	c		La.						*									
Jewett	l	l	vg	Miss.						*									
San Saba	sm	cov	vg	Tex.						*							*		
Stuart	l	rob		Miss.						*									
Van Deman	l	ob		Miss.						*									

Section 15.—NUTS—Continued.

SUBSECTION 5.—PERSIAN, ENGLISH, OR EUROPEAN WALNUT. (*JUGLANS REGIA*.)

[KEY.—Size: l, large; m, medium; v, very. Form: l, long; ob, oblong; ov, ovate; r, round. Quality: g, good; v, very. Abbreviation of name of place of origin: Fr., France.]

Name.	Description.				Districts and starring.														
	Size.	Form.	Quality.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Barthere	m	lov	vg	Fr															
Chaberte	m	ov	vg	Fr															
Cluster	m	ov	Fr																
Ford			g	Cal															
Franquette	l	lov	vg	Fr															
Gaut (<i>Bijou</i>)	vl		Fr																
Kaghazi	l		Cal																
Mayette	vl		vg	Fr															
Mesange (<i>Paper Shell</i>)			vg	Fr															
Meylan			Fr																
Mission (<i>Los Angeles</i>)			Cal																
Parisiene	l	rob	vg	Fr															
Preparturiens			Fr																
Santa Barbara			vg	Cal															
Serotina	m	r	Fr																
Vourey	l	rob	vg	Fr															

Division II.—SUBTROPICAL AND TROPICAL FRUITS.

This division includes such species only as, under cultivation or otherwise, have so far varied that the departures from the original types are recognized under varietal names.

The climate of the portion of Florida lying south of 27° north latitude is so far modified by its semiinsular position, together with the softening influence of the almost tepid waters of the adjacent Gulf Stream, as to practically adapt it to the successful cultivation of very many strictly tropical fruits. Such, therefore, as are recommended for cultivation in this region are indicated by the letter s in connection with the starring of District No. 6, of which this territory forms a part.

Section 1.—CITRUS FRUITS.

SUBSECTION 1.—BITTER ORANGES. (*CITRUS BIGARADIA*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, oblate; ob, oblong; ov, oval; r, round. Color: d, dark; l, light; o, orange; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: a, autumn; e, early; l, late; m, medium; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Braz., Brazil; For., Foreign; Jap., Japan.]

Name.	Description.						Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bitter Sweet.....	8-9	ro	do			dk	Fla						*	*								
Dwarf.....	8-9	ro	do			k	For						*	*								
Italian Sour.....	8-9					k	For						†	†								
Navel.....	8-9					k	For						†	†								
Phillips Bitter Sweet.....	8-9	ro	do			dk	Fla						**	*								
Sour.....	8-9	ro	do			k	Fla						*	*								

Section 1.—CITRUS FRUITS—Continued.

SUBSECTION 2.—CITRONS. (*C. MEDICA*.)

Name.	Description.							Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Lemon.....	8-9	ov	oy	3-4	.....	k	For...	.	.	.	.	.	**s	.	.	.	.	.	.	.	.	.	.
Lyman	5-6	ov	oy	3-4	.....	k	For...	.	.	.	.	.	**s	.	.	.	.	.	.	.	.	.	.
Orange	3-4	r	oy	6-7	.....	k	For...	.	.	.	.	.	**s	.	.	.	.	.	.	.	.	.	.

SUBSECTION 3.—KUMQUATS. KINKANS. (*C. JAPONICA*.)

Marumi.....	2-3	r	o	.....	.....	dkm	Jap.....						**s	*								
Nagami.....	2-3	o	o	.....	.....	dkm	Jap.....						**s	*							*	

SUBSECTION 4.—LEMONS. (*C. LIMONUM*.)

Belair.....	5-6	oov	ly	10	a	.....	For.....						**s									
Eureka.....	5-6	ov	ly	3-4	a	.....	Cal.....						**s									
Genoa.....	5-6	ov	.....	.....	.....	.....	For.....						**s								*	
Sicily.....	5-6	ov	ly	10	a	.....	For.....						**s								*	
Villa Franca.....	5-6	ov	ly	10	a	.....	For.....						**s									

SUBSECTION 5.—LIMES. (*C. LIMETTA*.)

Mexican.....	5-6	ov	ly	5-6	.....	.....	For.....						**s								*	
Perian.....	5-6	ov	.....	.....	.....	.....	For.....						**s									
Tahiti.....	7-8	ov	ly	5-6	.....	.....	For.....						**s								*	

SUBSECTION 6.—MANDARINS. (*C. NOBILIS*.)

China.....	5-6	o	lo	.....	.....	.....	For.....						**									
Cleopatra.....	3-4	.....	.....	.....	.....	.....	For.....						**									
Dancy Tangerine.....	6-7	o	r	.....	.....	.....	Fla.....						**									
Japan Tangerine.....	7-8	o	r	.....	.....	.....	Jap ¹						*									
King.....	7-8	o	ro	.....	.....	.....	Cal.....						**								†	
Satsuma.....	5-6	o	o	.....	.....	.....	Jap.....						**								*	
Sprack.....	.....	.....	.....	.....	.....	dm	Fla.....						†									
Tangerona.....	5-6	o	lo	.....	.....	.....	Braz.....						†									
Traveler.....	5-6	o	o	.....	.....	.....	.....						†									

SUBSECTION 7.—POMELOES. GRAPE FRUIT. SHADDOCKS. (*C. DECUMANA*.)

Aurantium.....	5-9	r	ly	3-4	lm	dm	Fla.....						**s									
Blood.....	8-9	r	voy	6-7	l	.....	For.....						**									
Forbidden Fruit ¹.....	.....	.....	.....	.....	.....	.....	For.....						**									
Hart.....	3-5	r	ly	5-6	lm	dm	Fla.....						**s									
Joselyn.....	3-5	r	ly	3-4	lm	dm	Fla.....						**s									
Mammoth.....	8-9	r	oy	6-7	l	.....	For.....						**									
Seedless.....	3-5	r	ly	6-7	.....	dm	Fla.....						†s									
Triumph.....	3-6	r	ly	5-6	lm	dm	Fla.....						**s									
Walter.....	5-9	r	ly	3-4	lm	dm	Fla.....						**s									

¹ The name commonly applied to the entire species.

Section 1.—CITRUS FRUITS—Continued.

SUBSECTION 8.—SWEET ORANGES. (*C. AURANTIUM*.)

Name.	Description.						Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Acapulco.....	7-9	r	o	3-5	m	dm	For						*									*
Acia.....	7-9	r	o	3-5	l	dm	For						*									*
Amory Blood.....	5-6	r	or	3-5	em	dm	For						*									*
Atwood Navel.....	5-6	ov	o	3-5	m	dm	For						*									*
Bahia (Washington Navel).....	7-9	rov	o	10	em	dm	For						*									**
Baldwin Blood.....	5-6	r	cr	3-5	m	dm	dm						*									*
Beach No. 5.....	7-9	ov	or	3-5	lm	dm	Fla						*									*
Bell.....	7-9	ov	o	3-5	m	dm	Fla						*									*
Beasio.....	7-9	o	o	3-5	l	dm	Fla						*									*
Boone Early.....	5-6	r	lo	3-5	ve	dm	Fla						*									*
Botelha.....	5-6	r	o	3-5	m	dm	For						*									*
Buttercourt.....	5-6	r	o	10	m	dm	For						*									*
Centennial.....	5-6	r	o	10	em	dm	Fla						*									*
Charley Brown.....	7-9	o	o	3-5	m	dm	For						*									*
China Sweet.....	5-6	o	o	3-5	m	dm	For						*									*
Circassian.....	3-5	r	o	5-6	m	dm	For						*									*
Colmar.....	5-6	ro	or	5-6	em	dm	For						*									*
Cunningham.....	5-6	r	o	5-6	em	dm	Fla						*									*
Drake Star.....	7-9	r	o	3-5	m	dm	For						*									*
Double Navel.....	5-6	ov	o	5-6	m	dm	Am						*									*
Dulcissima.....	3-4	r	o	5-6	e	dm	For						*									*
Dunmitt.....	7-9	r	o	3-5	m	dm	Fla						*									*
Du Roi.....	5-6	r	o	3-5	lm	dm	For						*									*
Egg (Beach No. 1).....	3-4	ov	o	6-7	ve	dm	Fla						*									*
Enterprise Seedless.....	5-6	r	o	5-6	e	dm	Fla						*									*
Exquisite.....	5-6	r	o	5-6	m	dm	For						*									*
Foster.....	5-6	r	o	3-5	e	dm	Fla						*									*
Hart Late (Excelsior).....	5-6	ov	o	3-5	vl	dm	For						*									*
Higley Late.....	5-6	r	o	3-5	l	dm	For						*									*
Honowassa.....	5-6	r	o	5-6	m	dm	Fla						*									*
Imperial Blood.....	5-6	r	or	5-6	e	dm	Fla						*									*
Jaffa.....	5-6	r	o	10	m	dm	For						*									*
Jaffa Blood.....	3-4	ov	or	10	m	dm	Fla						*									*
Lamb Summer.....	5-6	ov	o	10	vl	dm	Fla						*									*
Long.....	5-6	ov	o	3-5	m	dm	For						*									*
Magnum Bonum.....	7-9	r	o	5-6	m	dm	dm						*									*
Majorca.....	5-6	r	o	10	lm	dm	For						*									*
Maltese Blood.....	3-4	ov	or	10	m	dm	For						*									*
Maltese Egg.....	3-5	ov	o	5-6	m	dm	For						*									*
Maltese Oval.....	7-9	ov	o	5-6	l	dm	For						*									*
Mays Best.....	5-6	r	o	5-6	m	dm	Fla						*									*
Mays St. Michael.....	5-6	r	o	5-6	m	dm	Fla						*									*
Mediterranean Sweet.....	7-9	ov	o	5-6	l	dm	For						*									*
Melitensis Navel.....	7-9	rov	o	5-6	e	dm	For						*									*
Nonpareil.....	7-9	r	o	10	em	dm	Fla						*									*
Oblong, Early.....	5-6	ob	o	6-7	ve	dm	For						*									*
Old Vini.....	7-9	r	o	5-6	m	dm	Fla						*									*
Paper Rind St. Michael.....	3-4	ov	lo	3-5	lm	dm	For						*									*
Parson Brown.....	5-6	ov	o	3-5	e	dm	Fla						*									*
Peerless.....	5-6	r	o	5-6	m	dm	dm						*									*
Pineapple.....	3-4	r	lo	3-5	m	dm	Fla						*									*
Prata.....	5-6	r	lo	3-5	m	dm	For						*									*
Prolific.....	5-6	r	o	5-6	m	dm	For						*									*
Queen.....	5-6	ov	o	3-5	m	dm	For						*									*
Ruby.....	5-6	r	or	5-6	em	dm	For						*									*
St. Michael.....	5-6	r	o	3-5	m	dm	For						*									*
St. Michael Blood.....	5-6	r	o	10	m	dm	For						*									*
St. Michael Egg.....	7-9	ov	o	7-8	e	dm	For						*									*
Saul Blood.....	5-6	ob	or	5-6	m	dm	For						*									*
Seville, Sweet.....	3-4	r	o	3-5	ve	dm	For						*									*
Star Calyx.....	7-9	r	o	3-5	m	dm	For						*									*
Sustain Navel.....	7-9	r	o	3-5	m	dm	For						*									*
Thorpe Trophy.....	5-6	r	o	3-5	ve	dm	Fla						*									*
Valencia Late.....	7-9	ov	lo	3-5	l	dm	For						*									*
Vinous, Madam.....	5-6	r	o	10	m	dm	Fla						*									*
White.....	7-9	r	lo	3-5	m	dm	For						*									*
Whittaker.....	5-6	r	o	5-6	m	dm	Fla						*									*

Section 2.—FIGS. (*Ficus carica*.)

[KEY.—Size: 2-4, small; 4-7, medium; 7-9, large. Color: b, black; bl, blue; br, brown; g, green; p, purple; v, very; w, white; y, yellow. Quality: 1-6, good; 6-10, best. Season: s, summer. Use: d, dessert; k, kitchen; n, near market. Abbreviation of name of place of origin: For., Foreign.]

Name.	Description.						Districts and starring.														
	Size.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Adriatic, <i>White</i>	7-9	w	4-5	s	dkn	For.....						*	*	*							
Angeliue, (<i>Jaune Hatte</i>).....	4-7	y	1-6	s	dkn	For.....						*	*	*							
Black Ischia.....	4-7	b	1-6	s	dkn	For.....						*	*	*							
Brunswick (<i>Madonna</i>), (<i>Constantinople</i>).....	7-9	p	1-6	s	dkn	For.....						*	*	*							
Celestial (<i>Celeste</i>).....	2-4	yp	6-10	s	dkn	For.....						**	**	**							
Genoa, <i>Blue</i>	4-7	bl	1-6	s	dkn	For.....						*	*	*							
Green Ischia (<i>White Ischia</i>) (<i>White Italian</i>).....	4-7	g	1-6	s	dkn	For.....						**	**	**							
Lemon.....	4-7	y	1-6	s	dkn	For.....						*	*	*							
Magnolia.....	7-9	ybr				For.....						*	*	*							
Marseillaise, <i>White</i>	4-7	yw	1-6	s	dkn	For.....						*	*	*							
Turkey, <i>Brown</i>	4-7	br	6-10	s	dkn	For.....						*	**	**							

Section 3.—GUAVAS. (*Paidium*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: ov, oval; r, round. Color: g, green; r, red; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: a, autumn; s, summer. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: S. A., South America; W. I., West Indies; Mex., Mexico.]

Name.	Description.							Districts and starring.														
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Apple, <i>P. guajava</i> ...	5-6	r	g	3-4	sa	dkm	W. I.						**s	t								t
Cattley, <i>P. cattleianum</i> ...	3-4	r	r	3-4	sa	dkm	S. A.						**	*							t	
Chinese (Mexican) <i>P. lucidum</i> (l) ...	3-4	r	y	3-4	sa	km	Mex.						**	*							*	
Common, <i>P. guajava</i> ...			g		sa	dkm	W. I.						*s	*							t	
Large White, <i>P. guajava</i> ...																						
White Winter, <i>P. guajava</i> ...	7-8	ov	g	3-4	s	dkm	W. I.						*	t							t	
Yellow, <i>P. guajava</i> ...	5-6	ov	g	3-4	a	dkm	W. I.						*s	t							t	
Yellow, <i>P. guajava</i> ...	5-6	ov	y	3-4	s	dkm	W. I.						**s	t							t	

Section 4.—KAKIS, JAPANESE PERSIMMON. (*Diospyros kaki*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; o, oblate; ob, oblong; obo, obovate; p, pointed; r, round. Color: b, black; br, brown; c, carmine; d, dark; o, orange; r, red; s, salmon. Quality, scale 1 to 10: 1, very poor; 10, best. Season, e, early; l, late; m, medium; v, very. Use: d, dessert; m, market. Abbreviation of name of place of origin: Jap., Japan.]

Name.	Description.						Districts and starring.																
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Costata.....	5-6	rep	sr	4-5	l	dm	Jap.....						*	**	**								
Hachiya.....	10	obop	br	4-5	e	dm	Jap.....						*	**	**								
Hiyakume.....	7-8	(ro obo)	or	3-4	m	dm	Jap.....						*	**	**								
Kurokuma.....	7-8	r	r	5-6	m	dm	Jap.....						*	**	**								
Okame.....	7-8	ro	bc	5-6	em	dm	Jap.....						*	**	**								
Taber, 129.....	5-6	rp	or	4-5	ve	dm	Jap.....						*	**	**								
Tane Nashi.....	7-8	rep	lr	10	m	dm	Jap.....						*	**	**								
Tsuru.....	7-8	obp	br	3-4	vl	dm	Jap.....						*	**	**								
Yedo-Ichi.....	5-6	ro	dr	5-6	m	dm	Jap.....						*	**	**								
Yemon.....	7-8	rep	sr	3-4	m	dm	Jap.....						*	**	**								
Zengi.....	3-4	ro	dr	3-4	ve	dm	Jap.....						*	**	**								

Section 5.—OLIVES. (*Olea europea*.)

[KEY.—Size: l, large; m, medium; s, small; v, very. Form: o, oblique; ob, obovate; ov, oval; r, round. Color: b, black; d, dark; p, purple; v, violet. Abbreviations of names of places of origin: Fr., France.]

Name.	Description.				Districts and starring.														
	Size.	Form.	Color.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Atrorubens (<i>Saillern</i>)	sm	rov	vb	Fr.														*	
Atro-Vialacea	m	rov																*	
Broad Leaf Mission	m	ovo		Cal														*	
Caillon <i>Rubra</i>	uns	ov	b	Fr.														*	
Columella	m	ov	dp	Fr.														*	
Corregiola (<i>Grossajo</i>) (<i>Frantojo</i>)	m	ob		Italy														*	
Early Mission	m			Cal														*	
Hervaza	l	rov		Italy														*	
Lucques	m	ovob		Italy														*	
Macrocarpa	vl	ovob		Italy?														*	
Manzanillo	l	rov		Spain														*	
Mission	m	ov		Cal														*	
Narrow Leaf Mission	ml			Cal														*	
Nevadillo <i>Blanco</i>		ovo		Spain														*	
Oblitza	l			Italy														*	
Oliviere	m	ov		Fr.														*	
Pendoulier	l			Fr.														*	
Pendulina	ml	ov		Fr.														*	
Picholine (<i>Oblonga</i>)	m			Fr.														*	
Pigale	ml	ov		Fr.														*	
Polymorpha	vl			Fr.														*	
Razzo (<i>Frantojano</i>)	m	ov		Italy														*	
Redding <i>Picholine</i>	s	ov		Fr.														*	
Regalis		rov	pb	Fr.														*	
Rouget	s	r		Fr.														*	
Rubra	sm	ovo		Fr.?														*	
Varia	su	ov	dp	Fr.														*	
Verdale	sm	rov		Fr.														*	

Section 6.—PINEAPPLES. (*Ananassa sativa*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; ob, oblong; r, round. Color: d, dark; l, light; r, red; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season, s, summer. Use: d, dessert; k, kitchen; m, market. Abbreviation of name of place of origin. For., Foreign.]

Name.	Description.						Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Abachi (<i>Abakka</i>)	5-6	ob		10	s	dk	For						*s								*	
Albert, <i>Prince</i>	8-9	c		10	s	dk	For						ts								*	
Beatrice, <i>Lady</i>	8-9	c		10	s	dk	For						ts								*	
Black Antigua	8-9	ob	d	10	s	dk	For						*s								*	
Black Prince	8-9	c		10	s	dk	For						ts								*	
Blood	5-6			4-5	s	dk	For						ts								*	
Carrington, <i>Lord</i>	8-9	c		10	s	dk	For						ts								*	
Cayenne, <i>Smooth</i>	8-9	c		4-5	s	dk	For						*s								*	
Crown Prince	8-9	c		10	s	dk	For						ts								*	
Egyptian <i>Queen</i>	5-6	c	y	10	s	dkm	For						*s								*	
Jamaica, <i>Black</i>	8-9	ob	dy	10	s	dk	For						*s								*	
Kew, <i>Mammoth</i>	10			10	s	dk	For						ts								*	
Porto Rico	10	r	y	4-5	s	dk	For						*s								*	
Ripley <i>Queen</i>	5-6	c	y	10	s	dk	For						*s								*	
Rothschild, <i>Charlotte</i>	5-6	c		10	s	dk	For						*s								*	
Spanish, <i>Red</i>	5-6	r	ry	5-6	s	dkm	For						*s								*	
Sugar Leaf	5-6	c	y	10	s	dk	For						*s								*	
White Antigua	5-6	ob	l	10	s	dk	For						ts								*	

Section 7.—POMEGRANATES. (*Punica granatum*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: ov, oval; r, round. Color: r, red; v, violet; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: a, autumn. Use: d, dessert. Abbreviation of name of place of origin: Am., America]

Name.	Description.						Districts and starring.															
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Acid.....	10	ov	ry	.....	a	d	Am.....						*	*	*							
Dwarf.....	3-4	r	r	7-8	a	d	Am.?						*	*	*							
Purple.....	8-9	ov	ry	10	a	d	Am.....						*	*	*							
Sweet.....	8-9	r	r	10	a	d	Am.....						*	*	*							
Violet.....	10	r	v	10	a	d	Am.?						*	*	*							

Division III.—NATIVE AND INTRODUCED FRUITS AND NUTS GROWN IN THE OPEN AIR.

This division includes such species of native and introduced species of fruits and nuts grown under cultivation in the open air in the United States and Canada as are not included in Divisions I and II.

Section 1.—FRUITS.

Botanical name.	Common name.	Origin.	Districts and starring.														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Achras Sapota</i> Linn.....	Sapodilla.....	West Indies.....															
<i>Adansonia digitata</i> Linn.....	Baobab, Monkey Bread, Sour Bread.	Africa.....															
<i>Aegle marmelos</i> Correa.....	Bengal Quince.....	India.....															
<i>Akebia quinata</i> Decaisne.....	.....	Japan.....															
<i>Amelanchier alnifolia</i> Nutt.....	Western Dwarf Juneberry.....	Native.....															
<i>Canadensis</i> T. and G.....	Serviceberry, Shadberry, Juneberry.....	Native.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>var. oblongifolia</i> T. and G.....	Dwarf Juneberry.....	Native.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Anona cherimolia</i> Mill.....	Cherimoya, Cherimolia, Jamaica Apple.....	S. America.....															
<i>glabra</i> Linn.....	Pond Apple.....	Florida.....						*									
<i>muricata</i> Linn.....	Soursop.....	West Indies.....						*									
<i>reticulata</i> Linn.....	Custard Apple, Bullock's Heart.....	Trop. America.....						*									
<i>squamosa</i> Linn.....	Sugar Apple, Sweet-sop.....	West Indies.....						*									
<i>Antidesma Bunius</i> Spreng.....	.....	Malaysia.....															
<i>Arbutus unedo</i> Linn.....	Strawberry Tree.....	Europe.....															
<i>Artocarpus incisa</i> Linn.....	Breadfruit.....	Polynesia.....															
<i>integrifolia</i> Linn.....	Jackfruit, Jaca.....	India.....						*									
<i>Asimina grandiflora</i> Dunal.....	Papaw.....	Native.....						*	*	*	*	*	*	*	*	*	*
<i>triloba</i> Dunal.....	Papaw, Pawpaw.....	Native.....						*	*	*	*	*	*	*	*	*	*
<i>Averrhoa Billimbi</i> Linn.....	Billimbi.....	Ins. India.....															
<i>Carambola</i> Linn.....	Carambola.....	India.....															
<i>Berberis Aquifolium</i> Pursh.....	.....	Native.....															
<i>trifoliolata</i> Moric.....	Aljarita.....	Texas.....															
<i>vulgaris</i> Linn.....	Barberry, Berberry.....	Europe.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Carica Papaya</i> Linn.....	Papaw, Melon Papaw.....	Trop. America.....						*									
<i>Carriasa Arduina</i> , Lam.....	Amatungula.....	Africa.....						*									
<i>Carissa Carandas</i> Linn.....	Caraunda, Christ Thorn.....	India.....															
<i>Casimiroa edulis</i> Le Clare.....	White Sapota, Zapote Blanco.....	Mexico.....															
<i>Ceratonia Siliqua</i> Linn.....	Carob, Karoub, Algaroba, St. John's Bread.....	Asia, Africa.....						*									
<i>Cereus triangularis</i> Mill.....	Strawberry Pear.....	Trop. America.....						*									
<i>Chrysobalanus icaco</i> Linn.....	Cocoa Plum.....	Florida.....						*									

Section 1.—FRUITS—Continued.

Botanical name.	Common name.	Origin.	Districts and starring.														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Citrus bergamium</i> Risso...	Bergamot Orange	Asia															
<i>trifoliata</i> Linn.....	Trifoliolate Orange, Hardy Orange.	Japan	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Coccoloba uvifera</i> Linn....	Sea Grape, Shore Grape.	Eur., Asia															
<i>Cornus Mas</i> Linn.....	Carnelian Cherry	Eur., Asia	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Crataegus coccinea</i> Linn..	Haw. Thornapple	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
var. <i>mollis</i> T. and G.....	Haw	Texas															
<i>Cyphomandra betacea</i> Sendt.	Tree Tomato	Trop. Amer- ica.															
<i>Diospyros texana</i> Scheele..	Black Persimmon	Native															
<i>virginiana</i> Linn.....	Persimmon	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Elaeagnus multiflora</i> Thunb.	Goumi	Japan	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>umbellata</i> Thunb.....		Asia															
<i>Eriobotrya japonica</i> Lindl..	Loquat, Japanese Medlar.	Japan															
<i>Erythraedulia</i> S. Watson...	Brazil Cherry	Guad. Island.															
<i>Eugenia brasiliensis</i> Lam..		S. America															
<i>Jambos</i> Linn.....	Rose Apple	E. Indies															
<i>uniflora</i> Linn.....	Surinam Cherry	S. America															
<i>Feronia elephantum</i> Corr.	Elephant Apple	E. Indies															
<i>Ficus glomerata</i> Roxb.....	Cluster Fig	India															
<i>Fragaria californica</i> Cham. and Sch.	California Straw- berry.	California															
<i>chiloensis</i> Duchesne.....	Chile Strawberry	S. America															
<i>collina</i> Ehr.....	Green Strawberry, Hill Strawberry.	Europe															
<i>elatior</i> Ehr.....	Hautbois Strawberry	Europe	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Fragaria vesca</i> Linn.....	English Wild Straw- berry, Alpine.	Eur., native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>virginiana</i> Duchesne.....	Wild Strawberry	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>virginiana</i> var. <i>illinoensis</i> Gray.	Western Wild Straw- berry.	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Garcinia mangostana</i> Linn.	Mangosteen	Java															
<i>Glycosmis citrifolia</i> Lindl..		China															
<i>Hovenia dulcis</i> Thunb.....		Japan															
<i>Lycium mammosa</i> Gaert...	Mamsee Sapota																
<i>ruvica</i> var. <i>angustifolia</i> Gaert.	Egg Fruit; Tiesa, Canistel.																
<i>Mammea americana</i> Linn..	Mammee Apple	Jamaica															
<i>Mangifera indica</i> Linn.....	Mango	India															
<i>Melicocca bijuga</i> Linn.....	Ginep, Spanish Lime	Trop. Amer- ica.															
<i>Monstera deliciosa</i> Liebm..	Ceriman	Mexico															
<i>Morus alba</i> Linn.....	White Mulberry	Asia	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>nigra</i> Linn.....	Black Mulberry	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>rubra</i> Linn.....	Red Mulberry	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Musa chinensis</i> Sweet, syn. <i>M. Cavendishii</i> Lam- bert.	Dwarf Banana, Chi- nese Banana.	China															
<i>Musa corniculata</i> Lour.....	Lubang	Ins. India															
<i>paradisaca</i> Linn.....	Plantain	India															
<i>sapientum</i> Linn.....	Banana, Hog Banana	India															
<i>Myrica Nagi</i> Thunb., syn. <i>M. rubra</i> Sieb. and Zucc.		Asia															
<i>Nephelium Lit-chi</i> Cam- bess.	Litchi, Lee Chee	China															
<i>Nuttallia cerasiformis</i> T. and G.	Oso Berry	California															
<i>Opuntia Ficus-Indica</i> Mill.	Indian Fig	Trop. Amer- ica.															
<i>Tuna</i> Miller.....	Prickly Pear	W. Indies															
<i>vulgaris</i> Miller.....	Prickly Pear	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Passiflora edulis</i> Sims.....	Granadilla	S. America															
<i>incarnata</i> Linn.....	May Apple, May- pop.	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>laurifolia</i> Linn.....	Water Lemon	W. Indies															
<i>maliformis</i> Linn.....	Sweet Cup, Calabash	W. Indies															
<i>quadrangularis</i> Linn.....	Granadilla	Brazil															
<i>Pereskia aculeata</i> Miller...	Barbados Goose- berry.	W. Indies															
<i>Persea gratissima</i> Gaert...	Aguacate, Avocado, Alligator Pear.	Mexico															
<i>Phoenix dactylifera</i> Linn..	Date Palm	Africa															
<i>reclinata</i> Jacquin.....	Prickly Pear	Africa															
<i>syvestris</i> Roxb.....	Wild Date of India, Wine Palm.	India															
<i>Phyllanthus distichus</i> Mu- ell.	Otaheite Gooseberry	Ins. India															

Section 1.—FRUITS—Continued.

Botanical name.	Common name.	Origin.	Districts and starring.														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Physalis Alkekengi</i> Linn.	Strawberry Tomato, Winter Cherry.	Persia			*	*	*										
<i>peruviana</i> Linn.	Cape Gooseberry	S. America			*	*	*	*									
<i>Prunus Besseyi</i> Bailey	Western Dwarf Cherry.	Native										†	†	†			
<i>Capullin Zuoc.</i>	Capullin, Cupulino.	Mexico															*
<i>dasycarpa</i> Ehr.	Purple Apricot, Black Apricot.	Asia															
<i>demissa</i> Walp.	California Wild Cherry.	California.															
<i>emarginata</i> Walp.												*	*	*	*		*
<i>ilicifolia</i> Walp.	Islay	California.															
<i>Mahaleb</i> Linn.	Mahaleb Cherry	Eur., Asia		*	*	*	*										
<i>maritima</i> Wang.	Beach Plum	Native		*	*	*	*										
<i>Mume</i> Lieb. and Zuoc.	Chinese or Japanese Apricot.	Asia		*	*	*	*										
<i>pennsylvanica</i> Linn.	Pin Cherry, Bird Cherry.	Native	*	*	*	*	*		*	*	*						
<i>pumila</i> Linn.	Dwarf Cherry, Sand Cherry.	Native	*	*	*	*	*		*	*	*						
<i>Simonii</i> Carriere	Simon or Apricot Plum.	China.		*	*	*	*										
<i>subcordata</i> Benth.	Wild Plum of Calif.	California.															
<i>Watseni</i> Sargent.	Sand Plum	Native							*	*	*						
<i>Punica Granatum</i> Linn.	Pomegranate.	Afr., Asia															
<i>Pyrus Chinesis</i> Poiret.	Chinese Quince	Asia		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>germanica</i> J. Hooker	Medlar	Eur., Asia		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>japonica</i> Thunb.	Japanese Quince	Japan		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>coronaria</i> Linn.	Native Crabapple	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>rivularis</i> Dougl.	Oregon Crab	Native		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>salicifolia</i> Pall.		Asia		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Sorbus</i> Gaert.	Service Tree	Eur., Afr.		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Rhodomyrtus tomentosa</i> Wight.	Downy Myrtle	China.		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ribes aureum</i> Pursh	Missouri Currant	Native		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Rubus crataegifolius</i> Bunge.	Siberian Raspberry	Asia		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>deliciosus</i> Torr.		Native															
<i>microphyllus</i> Linn., syn. <i>R. palmatus</i> Thunb.		Japan															
<i>phenicolasius</i> Maxim.	Japanese Raspberry, Wineberry.	Japan		*	*	*	*										
<i>roseifolius</i> Sm., syn. <i>sor-bifolius</i> .	Strawberry-Raspberry.	Asia		†	†	†	†										
<i>trivialis</i> Mich.	Southern Dewberry.	Native						*	*	*	*	*	*	*	*	*	*
<i>ursinus</i> Cham. & Schlecht.	Oregon Dewberry	Native															
<i>Sambucus canadensis</i> Linn.	Elderberry	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Shepherdia argentea</i> Nutt.	Buffalo Berry	Native										*	*	*	*	*	*
<i>Solanum muricatum</i> Ait.	Pepino	S. America													*	*	*
<i>Tamarindus Indica</i> Linn.	Tamarind	Africa						*	*	*	*	*	*	*	*	*	*
<i>Triphasia Aurantiola</i> Lour.	Limeberry	China		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Vaccinium corymbosum</i> Linn.	Swamp Blueberry, Highbush Huckleberry.	Native	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>macrocarpon</i> Ait.	American Cranberry	Native		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>pennsylvanicum</i> Lam.	Blueberry	Linn.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Vangueria madagascariensis</i> J. F. Gmel.	Voa-vanga	Madagascar	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Viburnum Opulus</i> Linn.	Highbush Cranberry	Native										*	*	*	*	*	*
<i>Vitis arizonica</i> Engelm.		Arizona															
<i>Vitis Berlandieri</i> Planch.		Texas													*	*	*
<i>californica</i> Benth.		California									*	*	*	*	*	*	*
<i>candicans</i> Engelm.	Mustang Grape of Texas.	Texas															
<i>cinerea</i> Engelm.	Sweet Winter Grape	Native															
<i>cordifolia</i> Lam.	Winter Grape, Frost Grape.	Native							*	*	*	*	*	*	*	*	*
<i>Champini</i> Planchon.		Texas		*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Doaniana</i> Muns.	Doan's Grape	Native													*	*	*
<i>rupestris</i> Scheele	Sand Grape	Native															
<i>Solonis</i> Hort. Berol.		Native															
<i>Ximenia americana</i> Linn.	"Alvarillo del Campo."	Mexico															
<i>Zizyphus Jujuba</i> Lamarck.	Jujube	India						*	*	*	*	*	*	*	*	*	*
<i>sativa</i> Gaertn.	Jujube of S. Eur.	Asia		*	*	*	*	*	*	*	*	*	*	*	*	*	*

Section 2.—NUTS.

Botanical name.	Common name.	Origin.	Districts and starring.														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Aleurites triloba</i> Forst.	Candlenut.	Asia															
<i>Anacardium occidentale</i> Linn.	Cashew Nut.	India															
<i>Castanea dentata</i> Marsh.	American Chestnut.	Native.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>pumila</i> Mill.	Chinkapin, Chincapin, Chinquapin.	Native.															
<i>Calodendrum capensis</i> Thunb.	Cape Chestnut	S. Africa.															
<i>Castanopsis chrysophylla</i> A. De C.	Western Chinkapin.	Native.														*	*
<i>Castanospermum australe</i> Cunn.	Moreton Bay Chestnut.	Australia.														*	*
<i>Cocos nucifera</i> Linn.	Cocoanut.	E. Indies.						*									
<i>Cola acuminata</i> Schott and Endlich.	Kola, Bissay, Goora.	Africa															
<i>Corylus americana</i> Walt.	American Hazel.	Native.	*	*	*					*							
<i>californica</i> Rose.	California Hazel.	Native.														*	*
<i>rostrata</i> Ait.	Beaked Hazel.	Native.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Ginkgo biloba</i> Linn.	Ginko, Maidenhair Tree, Pa koo.	Asia	*	*	*												
<i>Gevuina Avellana</i> Molina.	Chilean Nut.	Chili.												*			
<i>Hicoria glabra</i> Britt.	Pignut.	Native.									*						
<i>laciniosa</i> Sarg.	Shellbark, Big Shellbark.	Native.	*	*	*												
<i>ovata</i> Britt.	Shagbark, Little Shellbark.	Native.	*	*	*				*	*	*	*	*	*	*	*	*
<i>Jubæa spectabilis</i> Humb.	Coquito, Small Coconut.	Chili.															
<i>Juglans californica</i> Wats.	California Black Walnut.	California															
<i>cinerea</i> Linn.	Butternut, White Walnut, Oilnut.	Native.	*	*	*				*	*	*	*	*	*	*	*	*
<i>cordiformis</i> Maxim.	Japanese Walnut.	Japan												*	*	*	*
<i>mandahurica</i> Maxim.	Japanese Walnut.	Asia												*	*	*	*
<i>nigra</i> Linn.	Black Walnut.	Native.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Sieboldiana</i> Maxim.	Japanese Walnut.	Japan	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Macadamia ternifolia</i> F.V. Muell.	Queensland Nut.	Australia.															
<i>Pistacia Terebinthus</i> Linn.	Turpentine Tree	Europe, Africa, Asia.															
<i>vera</i> Linn.	Pistachio.	Syria.												*	*	*	*
<i>Sapium sebiferum</i> Roxb.	Tallow Nut.	China.						*									
<i>Terminalia Catappa</i> Linn.	Tropical Almond.	E. Indies.						*	*	*	*	*	*	*	*	*	*
<i>Torreya nucifera</i> Lieb. & Zucc.		Japan												*	*	*	*

THE SOCIETY'S RULES FOR EXHIBITING AND NAMING FRUITS.

The rules of the American Pomological Society for exhibiting and naming fruits are as follows:

SECTION I.

NAMING AND DESCRIBING NEW FRUITS.

Rule 1.—The originator or introducer (in the order named) has the prior right to bestow a name upon a new or unnamed fruit.

Rule 2.—The society reserves the right, in case of long, inappropriate, or otherwise objectionable names, to shorten, modify, or wholly change the same, when they shall occur in its discussions or reports; and also to recommend such changes for general adoption.

Rule 3.—The name of a fruit should, preferably, express, as far as practicable by a single word, a characteristic of the variety, the name of the originator, or the place of its origin. Under no ordinary circumstances should more than a single word be employed.

Rule 4.—Should the question of priority arise between different names for the same variety of fruit, other circumstances being equal, the name first publicly bestowed will be given precedence.

Rule 5.—To entitle a new fruit to the award or commendation of the society, it must possess (at least for the locality for which it is recommended) some valuable or desirable quality, or combination of qualities, in a higher degree than any previously known variety of its class and season.

Rule 6.—A variety of fruit having been once exhibited, examined, and reported upon as a new fruit by a committee of the society, will not thereafter be recognized as such, so far as subsequent reports are concerned.

SECTION II.

COMPETITIVE EXHIBITS OF FRUITS.

Rule 1.—A plate of fruit must contain six specimens, no more, no less, except in the case of single varieties not included in collections.

Rule 2.—To insure examination by the proper committees, all fruits must be correctly and distinctly labeled, and placed upon the tables during the first day of exhibition.

Rule 3.—The duplication of varieties in a collection will not be permitted.

Rule 4.—In all cases of fruits intended to be examined and reported by committees, the name of the exhibitor, together with a complete list of the varieties exhibited by him, must be delivered to the secretary of the society on or before the first day of the exhibition.

Rule 5.—The exhibitor will receive from the secretary an entry card, which must be placed with the exhibit, when arranged for exhibition, for the guidance of committees.

Rule 6.—All articles placed upon the tables for exhibition must remain in charge of the society till the close of the exhibition, to be removed sooner only upon express permission of the person or persons in charge.

Rule 7.—Fruits or other articles intended for testing, or to be given away to visitors, spectators, or others, will be assigned a separate hall, room, or tent, in which they may be dispensed at the pleasure of the exhibitor, who will not, however, be permitted to sell and deliver articles therein, nor to call attention to them in a boisterous or disorderly manner.

SECTION III.

COMMITTEE ON NOMENCLATURE.

Rule 1.—It shall be the duty of the president, at the first session of the society, on the first day of an exhibition of fruits, to appoint a committee of five expert pomologists, whose duty it shall be to supervise the nomenclature of the fruits on exhibition, and in case of error to correct the same.

Rule 2.—In making the necessary corrections they shall, for the convenience of the examining and awarding committees, do the same at as early a period as practicable, and in making such corrections they shall use cards readily distinguishable from those used as labels by exhibitors, appending a mark of doubtfulness in case of uncertainty.

SECTION IV.

EXAMINING AND AWARDING COMMITTEES.

Rule 1.—In estimating the comparative values of collections of fruits, committees are instructed to base such estimates strictly upon the varieties in such collections which shall have been correctly named by the exhibitor prior to action thereon by the committee on nomenclature.

Rule 2.—In instituting such comparison of values, committees are instructed to consider: First, the values of the varieties for the purposes to which they may be adapted; second, the color, size, and evenness of the specimens; third, their freedom from the marks of insects, and other blemishes; fourth, the apparent carefulness in handling, and the taste displayed in the arrangement of the exhibit.

V. 1561.17
BULLETIN No. 7.

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF POMOLOGY.

THE FRUIT INDUSTRY,

AND

SUBSTITUTION OF DOMESTIC FOR FOREIGN-GROWN FRUITS,

WITH

HISTORICAL AND DESCRIPTIVE NOTES ON TEN
VARIETIES OF APPLE SUITABLE FOR
THE EXPORT TRADE.

BY

WILLIAM A. TAYLOR,
ASSISTANT POMOLOGIST.



WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1898.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,
Washington, D. C., June 4, 1898.

SIR: I have the honor to recommend that the article entitled "The fruit industry, and substitution of domestic for foreign-grown fruits," contributed by Mr. William A. Taylor, assistant pomologist, for the Yearbook for 1897, be reprinted with the addition of certain tables and discussion of fruit exports which were not included in the Yearbook article, and with "Historical and descriptive notes on ten varieties of the apple suitable for the export trade," as Bulletin No. 7 of this Division. It contains information that has never before been brought together in the form in which it appears, and for which there are frequent inquiries. Moreover, the subject-matter is of such a character as to closely connect it with the work of this office, and its publication in bulletin form will preserve it in our regular series of publications, where it properly belongs.

Very respectfully,

G. B. BRACKETT,
Pomologist.

Hon. JAMES WILSON,
Secretary.

III

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VII

THE FRUIT INDUSTRY, AND SUBSTITUTION OF DOMESTIC FOR FOREIGN-GROWN FRUITS.

By WILLIAM A. TAYLOR,

Assistant Pomologist, Division of Pomology.

INTRODUCTION.

The fruit industry, considered from the commercial standpoint, is of recent development in the United States. The colonists of the Atlantic Slope and the Mississippi Valley found a great variety and abundant supply of wild fruits and nuts in the forests. Those who came from England and other North European countries found indigenous representatives of most of their familiar fruits and nuts about their new homes, together with many which were new to them. They had but to gather of the abundance which surrounded them in summer and devise means for storing it for winter use. The pioneers of the lower Pacific Coast, on the contrary, found few attractive indigenous fruits, and were dependent upon such as they introduced and cultivated for their fruit supply, which was, therefore, from an early day, chiefly exotic.

FRUITS FOUND AND USED BY THE EARLY COLONISTS.

The chronicler of the expedition sent out by Raleigh to explore in the vicinity of Hatteras said of the grapes observed there that he had visited those parts of Europe in which this fruit was most abundant, and that the difference in quantity in favor of Roanoke was quite incredible.

Ralph Lane, in reporting his observations in 1585-86, pronounced the grapes of Virginia to be larger than those of France, Spain, or Italy.

John Smith found "Chestnuts whose wild fruit equalize the best in France, Spaine, Germany, or Italy to their tast[e]s that had tasted them all." He early learned to discriminate between the green and the ripe persimmon, for he states: "Plumbs there are of three sorts. The red and white are like our hedge plumbs; but the other, which they call Putchamins grow as high as Palmeta. The fruit is like a medler; it is first green, then yellow, and red when it is ripe; if it be not ripe it will draw a man's mouth awrie with much torment; but when it is ripe it is as delicious as an Apricot." He mentions also chinquapins, cherries, crab apples, and grapes, of which last named the colonists made "neere 20 gallons of wine, which was neere as good as your French Brittish wine." He describes at length the Indian methods of drying nuts and persimmons for the winter supply and of preparing them for food, and mentions among other summer fruits

"strawberries which ripen in April" and "Mulberries which ripen in May and June;" he also mentions gooseberries and raspberries as abundant.

The New England colonists made similar reports. In the words of one who was at Plymouth in 1622, "The chestnut, hazlenut, beechnut, butternut, and shagbark yielded contributions to the store of food laid up for winter. Wild cherries, mulberries and plums enlarged the variety of the summer's diet. Wild berries, as the strawberry, the gooseberry, the raspberry, the whortleberry, the cranberry, grew in plenty in the meadow and champaign lands. Vines bearing grapes of tolerable flavor flourished along the streams." Rev. Francis Higginson, writing from the Massachusetts colony in 1629, says: "Excellent vines are here, up and down in the woods. Our governor hath already planted a vineyard with great hopes of encrease; also mulberries, plums, raspberries, corrance, chestnuts, filberts, walnuts, smalnuts, hurtleberries, and hawes of white thorne, neer as good as our cherries in England, they grow in plentie here." William Wood, who came in 1629, reports, "There is likewise Strawberries in abundance, verie large ones, some being two inches about; one may gather halfe a bushell in a forenoone. In other seasons there be Gooseberries, Bilberries, Resberries, Treacleberries, Hurtleberries, Currants; which being dried in the Sunne are little inferior to those that our Grocers sell in England." He seems to have been a man of discriminating taste, for, unlike other writers of the period, he tempered his praise of some with condemnation of others, as in the following lines: "The Cherrie trees yield great store of Cherries which grow on clusters like grapes; they be much smaller than our English cherry, nothing neare so good if they be not fully ripe, they so furre the mouth that the tongue will cleave to the rooffe, and the throat wax hoarse with swallowing those red Bullies (as I may call them), being little better in taste. English ordering may bring them to be an *English* cherry but yet they are as wilde as the *Indians*. The Plummes of the Countrey be better for Plumbs than the Cherries be for Cherries; they be black and yellow about the bignesse of a Damson, of a reasonable good taste. The white thorne affords hawes as big as an English Cherrie which is esteemed above a Cherrie for his goodness and pleasantnesse to the taste." In his account, "New England's prospect," we find that comparisons of latitude and climate were being made with a view to determine the possibilities of domestic wine production, for he says "vines afford great store of grapes which are very bigge, both for the grape and Cluster, sweet and good; These be of two sorts, red and white, there is likewise a smaller kinde of grape which groweth in the Islands, which is sooner ripe and more delectable; so that there is no knowne reason why as good wine may not be made in those parts as well as in *Burdenaux* in *France*, being under the same degree." * * *

Roger Williams found the strawberry "the wonder of all the fruits growing naturally in these parts. In some places where the natives have planted I have many times seen as many as would fill a good ship within a few miles compass."

William Penn, writing in 1683, mentioned chestnuts, walnuts, plums, strawberries, cranberries, whortleberries, and grapes as growing naturally in the woods, and questioned whether it was best to attempt to improve the fruits of the country, especially the grapes, by the care and skill of art or to send for foreign stems and sets, already good and approved. It seemed to him most reasonable to believe that a thing grows best where it grows naturally, and that it would hardly be equaled by another of the same kind not naturally growing there.

The abundant and varied supply of indigenous fruits in the Mississippi Valley and Lake regions is still a matter of recollection among the surviving pioneers and their descendants.

CULTIVATION OF NATIVE FRUITS.

Recorded efforts to improve the native fruits by cultivation are more numerous in connection with the colonies in Virginia and Pennsylvania than in New England.

The abundance of indigenous fruits along the James naturally suggested to the colonists the wisdom of attempting their cultivation, and efforts in this direction were encouraged by the Virginia Company. As the wine supply of the mother country came entirely from foreign lands the company sought to encourage the culture of the grape in the Jamestown colony. The first efforts in this direction seem to have been made with the native grapes, the productiveness, size, and quality of which were so highly praised by the early settlers.

Lord Delaware, who arrived in 1610, brought with him French vine dressers, who, soon after their arrival, proceeded to transplant the native vines. We have no record of the outcome of this experiment nor of that of Dale, who, soon after the settlement at Henrico, in 1611, established a vineyard of 3 acres, in which he planted the vines of the native grape to test their adaptability to the production of wines that could be substituted for those of France and Spain.

In 1619 the Virginia Company sent several French vine dressers, with many slips of the finest vines that Europe afforded. These vine dressers reported that the grapes of the colony far excelled those of their native Languedoc, both in abundance and variety, and that they had planted their cuttings at Michaelmas and obtained grapes from them in the following spring. By an act of the assembly of that year every householder was compelled by law to plant ten cuttings and to protect them from injury. He was expected at the same time to acquire the art of dressing a vineyard, either by special

instruction or by personal observation. Such favor in the shape of bounties was bestowed upon those who actively engaged in vine culture that vineyards were established containing as many as ten thousand vines.

The wines sent to England failed to equal the expectations of the promoters, their inferior quality being ascribed at the time to the defective manner of manufacture. Some ascribed it to the perverseness of the vine dressers, who were thought to have concealed their knowledge out of spite against their employers, and by way of punishment the assembly refused to grant them permission to cultivate tobacco, to which crop they had probably turned to gain a subsistence.

Penn's inclination to favor the cultivation of native rather than introduced fruits has already been noted. But the failure of the native grapes to yield a good quality of wine whenever tried seems to have diverted attention from their improvement and that of other native fruits for about a century, and to have stimulated efforts to introduce the fruits of the Old World in the several colonies.¹

INTRODUCTION OF EXOTIC FRUITS.

The first recorded effort at introducing foreign fruits was made by the Jamestown colonists in May, 1607. Within two weeks after their arrival on Jamestown Island they had cleared land for sowing English wheat, and had reserved a space for a garden, in which were planted seeds of fruits and vegetables not indigenous to the country, including the melon, the potato, the pineapple, and the orange. These had doubtless been obtained by the colonists at Dominica or elsewhere in the West Indies while en route. The fate of the effort, so far as the pineapple and orange are concerned, may safely be left to the imagination.

The importation of cuttings of European vines in 1619 has already been noticed. In 1622, in compliance with the request of the authorities of the colony, the Virginia Company made provision for dispatching to Jamestown a pinnace containing not only wheat and barley, but also garden seeds and scions of fruit trees.

What success attended this effort is not recorded, but it is not unlikely that the apples, pears, peaches, apricots, vines, figs, and other fruits which Smith stated in 1629 "some have planted that prospered exceedingly" resulted from it. Certain it is that in 1647 the apple is recorded as grafted upon wild stocks in Virginia, while in 1686 William Fitzhugh, in describing his own plantation, mentions "a large orchard of about 2,500 apple trees, most grafted, well fenced with a locust fence."² By the close of the seventeenth century there

¹ For historical outline of improvement of native fruits, see "Century of American horticulture," by L. H. Bailey, in *Florists Exchange* for March 30, 1895.

² Letter of William Fitzhugh, April 22, 1686, *Economic History of Virginia in the Seventeenth Century*, by Philip Alexander Bruce, Vol. II, p. 243.

were few plantations in Virginia without orchards of apple, peach, pear, plum, apricot, and quince.

Frequent attempts were made to introduce in cultivation the fruits of the Mediterranean region. Importations of trees or cuttings of olives, lemons, oranges, pomegranates, and figs are frequently mentioned in the colonial records, but of these none but the fig is recorded as being successfully grown. Of this fruit, Smith wrote in 1629 that one Mistress Pearce, of Jamestown, an honest, industrious woman, had gathered from her garden in one year "neere an hundred bushels of excellent figges."

Of early introductions to New England, a memorandum was made March 16, 1629, "to provide to send for New England, Vyne Planters, Stones of all sorts of fruits, as peaches, plums, filberts, cherries, pear, aple, quince kernells, pomegranats, * * * also currant plants." It is a reasonable inference that these were sent, and that some of these and others succeeded with the colonists, for John Josselyn states in 1639 that the master of the ship in which he sailed from Boston October 11, 1639, "having been ashore upon the Governors Island, gave me half a score very fair Pippins which he brought from thence." After his second sojourn in New England, 1663-1671, he stated, "fruit trees prosper abundantly, Apple-trees, Pear-trees, Quince-trees, Cherry-trees, Plum-trees, Barberry-trees. I have observed with admiration that the kernels sown or the Succors planted produce as fair & good fruit without grafting as the Tree from whence they are taken; the Countrey is replenished with fair and large Orchards." "The Quinces, Cherries, Damsons, set the Dames a work; Marmalad and preserved Damsons is to be met with in every house." While on board ship, Josselyn was informed by one Mr. Woolcut (a magistrate in Connecticut colony) that he had made 500 hogsheads of cider from his own orchard in one year.

According to family tradition, a pear tree which stood near the mansion on Governor Endicott's farm was imported in 1630. Certain it is that Endicott soon after this propagated young trees (probably seedlings) and furnished them to other colonists both by gift and in exchange for land. Frequent importations of seeds, scions, and grafted trees, together with propagation from those already noticed, both by seeds and grafts, brought the orchards of New England up to such point that Dudley, in 1726, stated in a paper in the *Philosophical Transactions*, "our Apples are, without doubt as good as those of England, and much fairer to look to, and so are the Pears, but we have not got all the Sorts. * * * Our People of late years, have run so much upon Orchards, that in a village near Boston, consisting of about forty Families, they made near ten Thousand Barrels [of cider]."

Perhaps the earliest recorded grafted tree brought from Europe (that of Governor Endicott is stated to have been a seedling) was the

Summer Bonchretien, planted by Governor Stuyvesant in 1647 in New Amsterdam. It is said to have been brought from Holland, and its trunk remained standing on the corner of Third avenue and Thirteenth street, New York City, until 1866, when it was broken down by a dray. Many of the earliest introductions of named varieties of the pear, including White Doyenne, St. Germain, Brown Beurre, Virgouleuse, etc., were made by the French Huguenots, who settled about Boston and New York shortly after the revocation of the Edict of Nantes in 1685.

The early French colonists established orchards and vineyards along the rivers and lakes of the interior soon after their arrival. Through the agency of trappers and appreciative Indians, these fruits were soon widely distributed. Seedling trees of apple, pear, and peach were found bearing fruit in isolated localities throughout the Mississippi Valley and in the vicinity of the Great Lakes when the later settlers migrated there previous to the year 1800.

There is ample evidence that by the beginning of the present century few established homesteads in the Eastern United States were without a home supply of apples in their season, while many had peaches, pears, plums, cherries, and other fruits. But aside from the sale of cider made from apples, brandy from peaches, and, in a few localities, wine from wild or cultivated vines of the native grape, commerce in domestic fruits or their products could hardly be said to exist.

THE BEGINNING OF FOREIGN TRADE IN FRUITS.

The beginning of the foreign fruit trade of the United States is with difficulty distinguished at this time, but it seems to have started with the receipt of a shipment made in 1621 by the governor of Bermuda to the Jamestown colony. It consisted of "two great Chests filled with all such kinds and sorts of Fruits and Plants as their Ilands had; as Figs, Pomegranats, Oranges, Lemons, Sugar-canes, Plantanes, Potatoes, Papawes, Cassado roots, red Pepper, the Prickell Peare, and the like."¹ This was followed within a few months by the arrival in Bermuda from Virginia of "a small Barke with many thanks for the presents sent them; much Aquauitae, Oile, Sacke, and Bricks they brought in exchange of more Fruits and Plants, Ducks, Turkies, and Limestone; of which she had plenty and so returned."² As intercourse was frequent, there was undoubtedly a considerable import trade in such fresh fruits of the Tropics as would endure sail transportation between the more southern coast colonies and the West Indies, though little is on record to bear witness to the fact.

At what time the trade in the fruit products of southern Europe began is not known, but it was doubtless at an early day. The

¹ Capt. John Smith's Works, p. 681.

² Ibid., p. 682.

inventory of the Hubbard store, York County, Va., in 1667, discloses the following items: "Twenty-five pounds of raisins, one hundred gallons of brandy, and twenty gallons of wine."

As most of the dried and preserved fruits of the Mediterranean region were then considered luxuries rather than necessities, it is likely that the trade in them did not become important until the colonies had accumulated considerable wealth. It probably became an important item before the Revolution, and was, no doubt, seriously interfered with during the second war with England. It is a tradition among the fruit dealers of New York City that when it was desired to celebrate the signing of the Treaty of Peace in 1814 by a grand banquet, only a half barrel of raisins and currants and a box or so of citron could be found in the city for the making of a plum pudding.¹

In 1821, when the Treasury Department published its first statement of imports and exports, the imports of fruits and nuts, of which currants, raisins, figs, plums, prunes, and almonds are separately stated, amounted to 2,878,873 pounds, valued at \$181,035.

At about this time notices of auction sales of the fruits mentioned, and of oranges, lemons, Malaga grapes in jars, tamarinds, citron, Madeira nuts, and filberts were of frequent occurrence in the market reports of New York City.

The export trade seems to have begun with the apple, as a large supply existed in close proximity to the seaport towns. Trade in this fruit with the West Indies probably developed early in the eighteenth century, though we have no record of shipments until 1741, when it is stated that apples were exported from New England to the West Indies in considerable abundance. No transatlantic shipment has been disclosed earlier than that of a package of Newtown Pippin of the crop of 1758 sent to Benjamin Franklin while in London. The sight and taste of these brought to John Bartram, of Philadelphia, an order for grafts of the variety from Franklin's friend Collinson, who said of the fruit he ate: "What comes from you are delicious fruit—if our sun will ripen them to such perfection." Subsequently a considerable trade must have resulted, for in 1773 it was stated by the younger Collinson, that while the English apple crop had failed that year, American apples had been found an admirable substitute, some of the merchants having imported great quantities of them. In his words: "They are, notwithstanding, too expensive for common eating, being sold for two pence, three pence, and even four pence an apple. But their flavor is much superior to anything we can pretend to, and I even think superior to the apples of Italy."

Statistics on the subject are lacking until 1821, when the total export of fruit included in the Treasury statement consisted of 68,443 bushels of apples, valued at \$39,966.

¹ Letter from Hon. Antonio Zucca, January, 1898.

STATISTICS¹ OF THE FOREIGN FRUIT TRADE.

Since 1821 it has been possible to trace with some degree of accuracy the course of the foreign trade in fruits. With this end in view, a table showing the imports for the fiscal year 1821 is given; also tables showing average annual quantity and value by decades and imports by years since 1891 of each fruit itemized in the Treasury reports.

Imports of fruits during the fiscal year 1821.

Fruits.	Quantity.	Value.
	<i>Pounds.</i>	
Currants.....	24,688	-----
Figs.....	259,617	-----
Plums and prunes.....	125,300	-----
Raisins in jars.....	1,030,240	-----
All other raisins.....	1,174,210	-----
Almonds.....	264,818	-----
	2,878,873	\$181,035
Olive oil.....gallons.....	49,530	51,680

DRIED FRUITS.

RAISINS.

The largest item by far among the fruit imports of 1821 was raisins, more than three-fourths of the total quantity imported consisting of this fruit. During the decade ending 1840 the average annual quantity imported, as shown in the table, was nearly three times as great as during the first decade. Later the rate of increase was less, though imports continued to grow larger until the year 1884, when the maximum importation—56,676,657 pounds, valued at \$3,545,916.15—was reached. Since that time, in consequence of domestic production, almost wholly in California, the imports have diminished to about one-fifth of the maximum in quantity and to a little less than one-seventh in value. The following tables show the average annual imports of raisins by decades, 1830 to 1890, and imports by years, 1891 to 1897, inclusive:

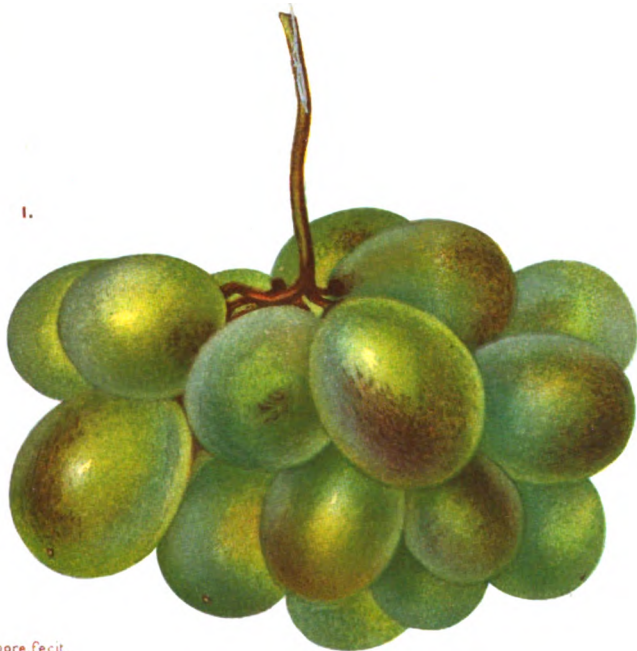
Average annual imports of raisins, by decades.

Decade ending	Quantity.	Value.
	<i>Pounds.</i>	
1830.....	4,437,000	-----
1840.....	13,203,732	\$787,798.00
1850.....	13,462,060	580,488.00
1860.....	19,008,255	1,086,238.00
1870.....	21,468,783	1,279,256.00
1880.....	33,731,861	2,209,215.00
1890.....	41,817,016	2,646,226.00
1891-1897.....	18,473,610	878,713.87

¹Average annual value for eight years, 1833 to 1840, inclusive.

¹All statistics of imports prior to 1868 in these tables are from the Treasury statements of "imports;" beginning with that year they are from "imports for consumption."

1.



D G Passmore, fecit.

2.



B Herges, fecit.

RAISIN GRAPES.

A. H. H. & Co. Lith.

1. GORDO BLANCO, MUSCATEL

2. ALEXANDRIA, MUSCAT.

Imports of raisins, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891	37,174,186	\$1,982,642.55
1892	18,873,670	927,247.44
1893	23,508,985	1,125,522.60
1894	13,660,498	566,626.90
1895	13,888,005	593,118.64
1896	10,202,066	443,285.00
1897	11,917,756	532,554.00

The introduction of the raisin varieties of grape to California is credited by Eisen to Col. Agoston Haraszthy, who, in 1852, imported vines of the Alexandria *Muscat* from Malaga, and in 1861 brought cuttings of Gordo Blanco from the same place. Numerous importations were made in subsequent years by different persons, but not until 1863 is there record of the production of cured raisins. In that year the late Dr. John Strentzel, of Martinez, exhibited at the California State Fair specimens of Muscat raisins, together with the dried fruit of four other varieties of grapes, to show the contrast between raisins and dried grapes. In 1873, 6,000 boxes, mostly from two vineyards in Solano and Yolo counties, were produced. In that year the first planting of raisin varieties was made at Fresno, and at Riverside in the same year, after which time the increase in production was rapid, 20,000,000 pounds having been produced in California in the year 1889, according to Eisen.

According to the California State Board of Horticulture, the shipments of raisins out of the State in 1896 amounted to nearly 69,000,000 pounds, a quantity considerably less than that of the three preceding years. The largest crop yet marketed, that of 1894, is estimated at 103,000,000 pounds. So far as can be seen, the production is capable of indefinite future increase, the recent low price of the product alone holding it in check.

The varieties of grape chiefly grown for curing into raisins are Gordo Blanco, *Muscatel*, and Alexandria *Muscat*, small second-crop clusters of which, from John Rock, Niles, Cal., 1897, will be found illustrated on Pl. III. In addition to these, there is an increasing production of the Sultana and the variety known in California as "Thompson Seedless."

Recently the seeding of raisins by machinery has been successfully inaugurated, so that at the present time California "seeded" raisins are on sale in small packages in all the leading cities.

"CURRANTS."

Imports of "currants" (the small seedless raisins of Greece) have varied greatly in quantity and value from year to year, but have on the average shown a continuous increase in quantity and value until

recently. The maximum quantity was reached in 1894, when, under stimulus of an expected levy of duty, the quantity imported reached 52,350,053 pounds, valued at \$773,952. The maximum value occurred in 1891, when 42,849,314 pounds, valued at \$1,577,852.15, were imported. The following tables show the average annual imports of currants by decades, 1830 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of currants, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1830.....	189,523	
1840.....	¹ 489,747	\$41,772.00
1850.....	1,334,631	60,860.00
1860.....	3,176,464	165,316.00
1870.....	5,886,839	196,447.00
1880.....	16,491,727	649,900.00
1890.....	28,189,074	1,022,075.00
1891-1897.....	34,505,448	872,941.02

¹ Average annual quantity and value for eight years, 1833 to 1840, inclusive.

Imports of currants, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	42,849,314	\$1,577,852.15
1892.....	36,665,728	1,209,085.75
1893.....	33,166,364	1,185,532.00
1894.....	52,350,053	773,952.00
1895.....	15,936,019	250,658.00
1896.....	32,351,985	540,694.25
1897.....	28,218,176	572,808.00

Currants, though long tested in a small way, have not up to this time been largely produced in this country. Vines of "Sultana" and "Corinth" grapes were imported as early as 1854 by the Patent Office and distributed in the "Middle and Western States," but like other varieties of the *vinifera* species did not succeed. At present prices there is little inducement for their production in California, but recent experience in certain localities in that State indicates that any marked rise in price would be followed by a considerable production of currants.

PLUMS AND PRUNES.

Plums and prunes to the quantity of 125,300 pounds were imported in 1821, and with the exception of the decade ending in 1850 a continuous and rapid increase in both quantity and value is shown by the annual averages until after 1890. The maximum importation occurred in 1888, when 82,914,579 pounds were received, valued at

\$2,679,759.16, though the maximum value, \$3,084,304.10, was attained in 1882. Since 1891 the decrease has been rapid, the quantity received in 1897 being less than one-eleventh and the value less than one-fortieth of that of 1892. The following tables show the average annual imports of plums and prunes by decades, 1830 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of plums and prunes, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1830.....	146,929	
1840.....	584,969	¹ \$50,856.00
1850.....	308,422	32,233.00
1860.....	3,853,635	200,854.00
1870.....	6,393,531	318,405.00
1880.....	25,108,911	1,860,180.00
1890.....	56,923,646	2,214,184.00
1891-1897.....	14,323,463	682,626.56

¹ Average annual value for seven years, 1834 to 1840, inclusive.

Imports of plums and prunes, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	41,012,571.0	\$2,139,215.00
1892.....	10,374,874.0	496,078.72
1893.....	23,225,821.0	1,049,896.48
1894.....	8,749,349.5	413,769.51
1895.....	15,311,695.0	533,748.21
1896.....	852,944.0	71,512.54
1897.....	736,987.0	74,165.46

The importance and rapid increase of the imports of prunes led to early efforts at their production in this country. Coxe, whose work was published in 1817, describes as grown in his time two varieties, "Prune plum" and "Prune Suisse," but does not discuss their usefulness for drying.

In 1854, when scions of "Prune d'Agen" and "Prune Sainte Catherine" were imported by the Patent Office and distributed "principally in the States north of Pennsylvania and certain districts bordering on the range of the Alleghany Mountains, in order to be engrafted upon the common plum," great hopes were held that this region would soon produce an abundance of the cured fruit. It was estimated at that time that the State of Maine alone, where the curculio was rarely seen, was "capable of raising dried prunes sufficient to supply the wants of the whole Union."

But though the trees thrived and produced fruit, as in the case of the fig in the South, the climatic conditions of the Eastern United States were found unfavorable to the production of the cured product.

The commercial production of prunes in this country may therefore be said to trace to a package of scions brought to San Francisco from France in 1856 by Pierre Pellier, and by him sent to his brother Louis at San Jose, Cal. But not until 1870, according to Lelong, was a large orchard planted. This was near San Jose, and its success led to the planting of numerous others from 1878 to 1881, since which time the industry has been firmly established on the Pacific Coast. The first cured prunes were exhibited at the California State Fair in 1863, and are said to have been of the German variety. As recently as 1881 the output of the largest growers in California did not exceed 5 or 6 tons of cured fruit per annum. The California production for 1896 was estimated at 55,200,000 pounds, a quantity which will be largely increased in the near future by the product of trees already planted but not yet of bearing age.

Outside of California the principal prune production is in Washington, Oregon, and Idaho. The Italian prune (syn. *Fellenberg*) was introduced into Oregon from the Eastern States by Seth Lewelling in 1857, and is the leading variety grown outside of California. In recent years plantings of this and other sorts in the States mentioned have been very large. The latest available estimate at this writing of the crop of 1897 in Oregon and Washington places it at 12,000,000 pounds of cured fruit. It is safe to conclude that the present prune-producing capacity of the orchards of the United States exceeds 100,000,000 pounds of cured fruit annually. The leading varieties grown in California at the present time are Agen (syns. *d'Agen*, *Petite*, *Petite d'Agen*, *French*, *California*), *Sergeant*, *Robe de*, and *Golden Drop*, *Coe* (syn. *Silver Prune*), while the leading variety of the more northern district is Italian (syn. *Fellenberg*). These, with *Epineuse*, *Imperiale*, a promising variety recently imported from France, are illustrated on Pl. IV. The specimens shown on the plate are from the following sources: Agen, Sergeant, and Golden Drop, from Leonard Coates, Napa, Cal., 1897; Italian, from the late Seth Lewelling, Milwaukee, Oreg., 1891; *Epineuse*, from John Rock, Niles, Cal., 1897. Numerous other European varieties are grown in a small way, and a number of promising local seedlings are commercially planted in different sections.

FIGS.

Figs constituted an important item in 1821, when 259,217 pounds were imported, and notwithstanding a considerable domestic production in recent years, the average annual imports continue to increase. The maximum quantity was reached in 1896, when 11,635,493 pounds, valued at \$629,488, were imported, though the greatest value in any year was that of 1882, when it amounted to \$678,341.87. The



D G Passmore, fecit.

A. Horn & Co. Lith.

PRUNES.

1. EPINEUSE, IMPERIALE.
2. SERGENT, ROBE DE.
3. GOLDEN DROP, OOE.
4. AGEN, SYNS. D' AGEN, PETITE D' AGEN, "FRENCH," "CALIFORNIA."
5. ITALIAN, SYN. FELLEBERG.



D. G. Passmore, artist.

DRYING FIGS.

- | | |
|--------------------|----------------------|
| 1. SMYRNA. | 3. ADRIATIC. |
| 2. SMYRNA SECTION. | 4. ADRIATIC SECTION. |

Allen & Co. Lith.

following tables show the average annual imports of figs by decades, 1830 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of figs, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1830.....	701,769	
1840.....	1,656,104	\$23,606.00
1850.....	1,569,201	81,435.00
1860.....	4,171,327	184,128.00
1870.....	3,565,301	185,202.00
1880.....	5,436,912	370,940.00
1890.....	7,042,451	497,304.00
1891-1897.....	9,630,155	548,812.00

¹Average annual value for seven years, 1834 to 1840, inclusive.

Imports of figs, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	9,063,063	\$672,141.00
1892.....	8,324,861	510,591.03
1893.....	10,060,092	549,488.22
1894.....	7,930,316	372,613.50
1895.....	11,550,092	574,393.45
1896.....	11,635,493	629,498.00
1897.....	8,837,572	532,974.50

The early efforts at the production of figs have already been noted. Frequent importations of plants and cuttings of choice varieties were made, and at one time the hope was expressed that the South Atlantic and Gulf States would produce a sufficient supply of the dried fruit to supplant the imported article. Such has not been the fact, however, the humidity of the air during the ripening period having been found to prevent successful curing, though a family supply for immediate consumption and preserving has long been produced on the homesteads of many portions of that region. At Biloxi, Miss., and New Orleans, La., a considerable pack of canned and preserved figs is now made annually, the Celeste being preferred by canners for this use.

In California the fig was introduced by the Franciscan missionaries from Lower California, who, led by Junipero Serra, established a mission at San Diego in 1769 and later at twenty other points within the present boundaries of the State. The most widely grown and popular variety in the State until comparatively recent times was known as the California Black, or Mission, fig, but it has largely been replaced by the sort known in California as Adriatic, which, according to Eisen, was twice imported from Italy between 1867 and 1877. This variety (see Pl. V, specimen from G. C. Roeding, Fresno, Cal., 1897) is at

present the most widely planted drying fig in California. It has many points of merit, but the fact that its quality when dried is inferior to that of the imported dried fruit from Smyrna has resulted in several efforts to introduce and grow the Smyrna types of fig.

A large importation of cuttings from Smyrna was made in 1882 by G. P. Rixford for the San Francisco Bulletin and distributed widely throughout the State. Since then other importations have been made, trees from which are growing at different places. Among these importations several valuable figs are found, one of which, at least, is of superior quality for drying; but so far as tested they fail to produce fruit unless artificially pollinated. It is now generally conceded that this type of fig can not be commercially grown except by the process of caprification, which is practiced upon it in Asia. A specimen, from G. C. Roeding, Fresno, Cal., 1897, of the Smyrna fig brought to full maturity by hand or "blowpipe" pollination in 1897 is illustrated on Pl. V. As more than three-fourths of our imports of figs are now of the Smyrna type, a prompt and thorough test of caprification would seem advisable. The present annual production of cured figs in California is about 2,500,000 pounds.

DATES.

The first statistics of date importations are found in 1824, when 44,426 pounds were imported. The average annual importation shows an increase in each period save that ending in 1850. The maximum for any year, both in quantity and value, occurred in 1891, when 20,091,012 pounds, valued at \$661,596.41, were received. As no dates have yet been commercially grown in this country, the causes of the continuous decrease in imports since 1891 must be found elsewhere than in domestic production.

The following tables show the average annual imports of dates by decades, 1830 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of dates, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1830.....	¹ 44,426	-----
1840.....	² 429,355	-----
1850.....	³ 362,227	³ \$5,056.00
1860.....	1,553,079	28,881.00
1870.....	1,718,248	41,108.00
1880.....	4,060,331	107,682.00
1890.....	8,884,713	234,132.00
1891-1897.....	15,193,490	422,913.37

¹ Quantity for one year, 1824.

² Average annual quantity for three years, 1831 to 1833, inclusive.

³ Average annual quantity and value for eight years, 1843 to 1850, inclusive.

Imports of dates, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	20,091,012.00	\$661,596.41
1892.....	17,089,367.00	551,648.26
1893.....	16,248,515.00	494,628.51
1894.....	12,408,409.00	387,584.01
1895.....	14,716,765.00	308,595.45
1896.....	13,575,254.96	270,723.89
1897.....	12,225,111.00	285,617.06

TAMARINDS.

Tamarinds were first separately scheduled in 1873, when 54,429 pounds were received, valued at \$2,422.10. There has been a regular increase in the annual average since that time, though the imports fluctuate greatly from year to year. There is no domestic commercial production of this fruit. The following tables show the average annual imports of tamarinds by decades, 1880 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of tamarinds, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1880.....	¹ 16,542	² \$644.49
1890.....	³ 52,145	1,976.11
1891-1897.....		2,891.10

¹ Average annual quantity for seven years, 1873 to 1879, inclusive, and 1878 to 1880, inclusive.

² Average annual value for eight years, 1873 to 1880, inclusive.

³ Average annual quantity for five years, 1881 to 1885, inclusive.

Imports of tamarinds, by years.

Year.	Value.
1891.....	\$6,233.00
1892.....	5,471.00
1893.....	1,401.00
1894.....	1,247.00
1895.....	470.00
1896.....	2,716.76
1897.....	2,699.00

FRESH FRUITS AND FRUIT PRODUCTS.¹

ORANGES.

Auction sales of oranges from the Mediterranean were of frequent occurrence in New York City early in the present century, but no separate mention of oranges in the schedules of imports appeared until 1855, when their value is given as \$476,694. During the four years that this fruit was separately scheduled the imports varied from that amount to \$753,695 in 1860. From 1862 to 1882, inclusive, oranges are not separately stated; but in 1883, when the item reappears, it amounts to \$3,010,662.56. This was the maximum, and was followed by a decline, which reached its lowest point in 1894. The great freezes of 1894 and 1895 were promptly followed by largely increased importations, which probably reached their maximum in 1897, when a value of \$3,341,646.64 was reached. The following tables show the average annual imports of oranges by decades, 1860 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of oranges, by decades.

Decade ending—	Value.
1860.....	¹ \$125,024.00
1870 ²	² 481,641.00
1880 ²	
1890 ²	12,238,447.34
1891-1897.....	2,054,408.92

¹ Average annual value for three years, 1858 to 1860, inclusive.

² Oranges were included with lemons and limes from 1862 to 1865, and with lemons from 1866 to 1882, inclusive.

³ Value for one year, 1861.

⁴ Average annual value for eight years, 1883 to 1890, inclusive.

Imports of oranges, by years.

Year.	Value.
1891.....	\$2,330,127.71
1892.....	1,210,080.90
1893.....	1,096,277.24
1894.....	1,111,059.15
1895.....	1,907,515.31
1896.....	2,694,155.50
1897.....	3,341,646.64

The sour orange is supposed to have been introduced to Florida soon after the settlement of St. Augustine in 1565. The species found a congenial home, and was soon widely scattered throughout the

¹ Not including wine and brandy.

peninsula. The sweet orange was undoubtedly introduced at a later date, and being easily propagated both by seeds and buds was generally distributed throughout the settled portions before the beginning of the present century. Commercial orange culture as now practiced did not begin until after the acquisition of Florida by the United States, and at first was confined to such eligible sites as existed along navigable water which afforded transportation for the fruit. After the close of the late war the industry grew with wonderful rapidity as railroads and steamboats made possible the shipment of the fruit for longer distances. In the season of 1886-87 over 1,000,000 boxes were marketed, and by 1894-95 the annual crop amounted to over 5,000,000 boxes. Since 1894-95 shipments have been comparatively insignificant, but with favorable seasons may be expected to reach 1,000,000 boxes by the year 1900.

A considerable production of oranges was developed in a limited district in southern Louisiana previous to 1886, but since the freeze of that year the crop of that district has been of little commercial importance.

In California the orange was planted in the mission gardens at an early date, and according to a recent writer in the *Fruit Trade Journal* the first orchard was planted at San Gabriel in 1804. An orchard was planted at Los Angeles by Don Louis Vignes in 1834, and General Bidwell reported that in 1845 the three largest orange orchards there were those of Wolfskill, Carpenter, and Vignes.

The present era of commercial orange growing in California dates from the foundation of the Riverside colony in 1872. The orange was largely planted early in the history of the colony, and after the adaptability of the Bahia (syns. *Washington Navel*, *Riverside Navel*, etc.), two trees of which were sent to Riverside by Mr. William Saunders, of the Department of Agriculture, in 1873, was demonstrated, it soon became, as it continues to be, the leading fruit of the district. Oranges are grown commercially in several portions of the State, but chiefly in southern California. It is estimated that the crop now being marketed from the State will exceed 3,500,000 boxes.

Oranges are also commercially grown in Arizona, shipments aggregating 149 car loads having been made from Phoenix in a single week of December, 1897.

LEMONS.

Imports of lemons were first separately stated in 1858, when they amounted to \$301,492. From 1862 to 1882, inclusive, lemons were not separately scheduled, but in 1883 the imports had risen in value to \$2,555,787.49. The maximum was reached in 1896, when lemon imports amounted to \$5,027,732.95. The tables on page 322 show the average annual imports of lemons by decades, 1860 to 1890, and imports by years, 1891 to 1897, inclusive.

Average annual imports of lemons, by decades.

Decade ending—	Value.
1860.....	¹ \$345,957.00
1870 ²	² 215,908.00
1880 ²	
1890.....	³ 3,024,557.95
1891-1897.....	4,450,725.74

¹ Average annual value for three years, 1858 to 1860, inclusive.² Included with limes and oranges, 1862 to 1865, and with oranges from 1866 to 1882.³ Value for one year, 1861.⁴ Average annual value for eight years, 1883 to 1890, inclusive.*Imports of lemons, by years.*

Year.	Value.
1891.....	\$4,345,979.08
1892.....	4,590,261.17
1893.....	4,993,829.87
1894.....	4,294,815.92
1895.....	3,917,106.75
1896.....	5,027,732.95
1897.....	4,025,354.49

Lemon production on a commercial scale in Florida is commonly traced to the introduction of choice Mediterranean varieties by General Sanford about 1874. Much difficulty was for some years experienced in determining the proper methods of curing and marketing the fruit, and just as a reasonable degree of success was attained the freezes of 1894 and 1895 destroyed a very large proportion of the groves of the State. As the lemon is less hardy than the pomelo and orange, comparatively little interest in its culture has been manifested in Florida since 1895.

In California commercial lemon culture is also of comparatively recent date, a beginning having been made at National City by F. A. Kimball in 1869. It is estimated by the California Fruit Grower that on January 1, 1897, there were 1,197,098 lemon trees in orchards in the State, of which 231,510 were of bearing age. The crop of 1896-97 which, as nearly as could be determined, amounted to 462,900 boxes, is likely to show a large annual increase and to greatly reduce importations of this fruit.

LIMES.

Limes were first separately scheduled in 1858, when imports amounted to but \$2,024. So far as can be ascertained, the maximum importation was reached in 1891, when the value was \$59,867.35. A distinct decrease has occurred since then, the imports of 1897 amounting to but \$28,700.29. The following tables show the average annual

imports of limes by decades, 1860 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of limes, by decades.

Decade ending—	Value.
1860.....	¹ \$3,321.00
1870.....	² 10,170.00
1880.....	³ 29,795.80
1890.....	48,765.70
1891-1897.....	41,437.46

¹ Average annual value for three years, 1858 to 1860, inclusive.

² Value for one year, 1861.

³ Average annual value for nine years, 1872 to 1880, inclusive.

Imports of limes, by years.

Year.	Value.
1891.....	\$50,867.35
1892.....	37,829.45
1893.....	47,196.36
1894.....	48,763.50
1895.....	28,103.63
1896.....	30,601.69
1897.....	28,700.29

Though grown in a small way in southern Florida since an early date, the lime has never risen to distinct commercial importance there, while in California, except possibly in a few specially favored localities, its cultivation for market has not been attempted.

IMPORTS OF ORANGES, LEMONS, AND LIMES COMBINED.

To show clearly the growth of the trade in the more important citrus fruits, tables showing the combined average annual imports of oranges, lemons, and limes by decades, 1860 to 1890, and imports by years, 1891 to 1897, inclusive, together with tables of such of the more important manufactured products derived from the fruits mentioned as are capable of segregation, are given as follows:

Average annual imports of oranges, lemons, and limes, by decades.

Decade ending—	Value.
1860.....	¹ \$837,102.33
1870.....	² 1,347,600.46
1880.....	³ 3,661,843.56
1890.....	5,245,829.89
1891-1897.....	6,546,572.07

¹ Average annual value for six years, 1855 to 1860, inclusive.

² Exclusive of limes, 1866 to 1870.

³ Exclusive of limes for 1871.

Imports of oranges, lemons, and limes, by years.

Year.	Value.
1891.....	\$6,735,974.14
1892.....	5,808,171.52
1893.....	6,737,303.47
1894.....	5,444,638.57
1895.....	5,942,725.29
1896.....	7,761,490.14
1897.....	7,365,701.42

Average annual imports of lemon and orange oil, by decades.

Decade ending	Quantity.	Value.
	<i>Pounds.</i>	
1870.....	¹ 51,897.00	¹ \$102,217.78
1880.....	72,186.51	182,447.15
1890.....	154,217.61	211,321.96
1891-1897.....	225,731.00	285,320.63

¹ Average annual quantity and value for six years, 1865 to 1870, inclusive.*Imports of lemon and orange oil, by years.*

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	179,412.33	\$270,255.39
1892.....	215,794.88	402,907.00
1893.....	222,830.72	383,226.22
1894.....	212,876.00	240,487.00
1895.....	238,281.00	216,043.00
1896.....	206,656.13	214,302.00
1897.....	304,270.90	270,023.82

Average annual imports of lemon, lime, and sour orange juice,¹ by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1870.....		² \$8,662.97
1880.....	³ 345,568	59,916.51
1890.....	⁴ 553,277	92,434.30
1891-1897.....		112,076.48

¹ Lemon and lime juice only, previous to 1891.² Average annual value for two years, 1869 and 1870.³ Average annual quantity for eight years, 1873 to 1880, inclusive.⁴ Average annual quantity for three years, 1881 to 1883, inclusive.

Imports of lemon, lime, and sour orange juice, by years.

Year.	Value.
1891.....	\$140,672.80
1892.....	156,832.75
1893.....	195,203.59
1894.....	71,021.00
1895.....	61,884.00
1896.....	84,073.25
1897.....	74,848.00

Average annual imports of orange and lemon peel, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1870.....		¹ \$1,383.25
1880.....	² 115,600	6,225.51
1890.....	³ 218,500	5,076.25
1891-1897.....		13,540.34

¹ Average annual value for two years, 1869 and 1870.

² Average annual quantity for two years, 1873 and 1874.

³ Average annual quantity for three years, 1881 to 1883, inclusive.

Imports of orange and lemon peel, by years.

Year.	Value.
1891.....	\$5,222.14
1892.....	5,185.78
1893.....	7,742.45
1894.....	11,734.00
1895.....	20,579.02
1896.....	15,853.00
1897.....	28,496.00

The above tables show that the total imports of the three fruits named were valued in 1897 at \$7,395,701.42. If to this be added the value of imports of the principal manufactured products derived from them, viz, juice, oil, and peel, together with a reasonable estimate for items like pomeloes, preserved citron, orange and lemon peel, etc., known to be included under other heads, we may safely conclude that the value of our imports of products of the genus *citrus* in 1897 exceeded \$8,000,000.

BANANAS AND PLANTAINS.

The history of the development of the import trade in bananas is one of the most striking features of the American fruit trade. According to the Fruit Trade Journal, a lot of 30 bunches was brought in 1804 by Captain Chester, of the schooner *Reynard*. In 1830 the first

cargo, which consisted of 1,500 bunches, was brought, and not until 1857 was a regular trade developed between Baracoa and Boston. This continued until 1869, when an additional source of supply was needed, and Mr. William C. Bliss, the pioneer in the Baracoa banana trade, obtained a small cargo of the fruit at Port Antonio, Jamaica, and left an agent there to encourage its production. In 1870 he secured three cargoes and in 1871 seven cargoes from the same port.

Imports of bananas are first noted in 1871, when they amounted to \$229,924.12 in value, and gradually increased until 1882, when they suddenly increased to \$1,190,591.43, an amount nearly two and a half times as great as the average annual imports of the preceding decade. This sudden increase was in large measure due to the short fruit crop of the season of 1881 throughout the Eastern United States. The banana trade received great stimulus and the imported fruit became known and appreciated in many sections where it had been but rarely seen before; after 1881 it grew rapidly until 1891. Since the latter date there has been an apparently steady, though slow, decline in value, probably due to the increased supply of domestic fruits of other kinds. The chief sources of supply are the Central American States, Colombia, and the West Indies for the Eastern United States, and the Hawaiian Islands for the Pacific Coast. The following tables show the average annual imports of bananas by decades, 1880 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of bananas, by decades.

Decade ending—	Value.
1880.....	\$461,735.49
1890.....	2,372,241.43
1891-1897.....	4,943,082.20

Imports of bananas, by years.

Year.	Value.
1891.....	\$5,855,682.04
1892.....	5,000,399.65
1893.....	5,361,183.34
1894.....	5,121,180.27
1895.....	4,673,833.88
1896.....	4,503,358.51
1897.....	4,065,947.83

The only domestic commercial production of bananas is in southern Florida, and this can hardly be said to furnish a local supply in the localities where grown.

The imports of plantains, which amounted to \$7,596.23 in 1872, gradually increased until 1888, when a maximum of \$31,786.38 was

reached. Since that year there has been a decline in the value of imports. The following tables show the average annual imports of plantains by decades, 1880 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of plantains, by decades.

Decade ending—	Value.
1880.....	¹ \$10,982.81
1890.....	22,258.40
1891-1897.....	24,292.97

¹ Average annual value for nine years, 1872 to 1880, inclusive.

Imports of plantains, by years.

Year.	Value.
1891.....	\$27,839.00
1892.....	31,124.45
1893.....	24,749.75
1894.....	17,731.85
1895.....	22,106.30
1896.....	19,264.55
1897.....	27,244.76

The plantain, though more highly esteemed in tropical countries than the banana, has never attained popularity in this country.

PINEAPPLES.

In view of the development of commerce with the West Indies at an early day it is probable that the pineapple, notwithstanding its perishable nature, was one of the first fruits that reached the South Atlantic ports.

Imports were not separately scheduled until 1871, when they amounted to \$187,960.93. The value of imports increased until 1876, when a noticeable decrease occurred, lasting until 1881, when the minimum, \$121,659.70, was reached. After this they increased until 1894, when the maximum, \$753,129.32, was attained. The following tables show the average annual imports of pineapples by decades, 1880 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of pineapples, by decades.

Decade ending—	Quantity.	Value.
	Barrels.	
1880.....		\$201,766.04
1890.....		345,319.29
1891-1897.....	¹ 271,635.53	541,009.33

¹ Quantity for one year, 1897.

Imports of pineapples, by years.

Year.	Quantity.	Value.
	<i>Barrels.</i>	
1891.....		\$558,297.77
1892.....		746,560.90
1893.....		743,861.22
1894.....		753,129.32
1895.....		314,539.09
1896.....		332,067.54
1897.....	271,635.53	338,619.53

Cultivation of pineapples in a small way in Florida probably began at an early day. A note in the *New England Farmer* for 1850 says: "The cultivation of the pineapple has been commenced in Florida, and with a little protection occasionally in winter, it is believed this delicious fruit can be raised in that State in abundance." This probably referred to efforts in the vicinity of St. Augustine, where the winter temperature is now known to be too low for this species.

In 1860 planting began on the Keys and proved so profitable that the area devoted to it has steadily increased, while its culture has extended northward along both the Atlantic and Gulf coasts of Florida, and, with shed protection, has been very successful at several points in the interior as far north as Orlando. According to Webber, about 3,000,000 fruits were produced in 1894. The freezes of the winter of 1894-95 temporarily checked the output of this fruit, but the recovery has been so rapid that a largely increased production may be expected in the future.

The variety most widely grown is the Spanish, but there is an increasing proportion of larger and better varieties, including Queen, Abbaka, Smooth Cayenne, and Porto Rico.

In California, pineapple culture is yet confined to experimental plantings, which, in one or two localities, have been fairly successful.

GRAPES.

The imports of fresh grapes consist almost entirely of the large and meaty grapes of Almeria, commonly known in our markets as "Malagas." Auction sales of such in jars, at 35 to 40 cents per pound, were of frequent occurrence in New York early in the present century, but they are not itemized in the statement of imports until 1865, when their value was \$17,645. After this the increase was rapid and reasonably constant until 1894, when a value of \$816,602 was attained. The maximum quantity, as near as can be ascertained, was in 1892, when 228,934 barrels of about 40 pounds each were imported. The tables on page 329 show the average annual imports of grapes by decades, 1870 to 1890, and imports by years, 1891 to 1897, inclusive.

Average annual imports of grapes,¹ by decades.

Decade ending—	Quantity.	Value.
	<i>Barrels.</i>	
1870.....		² \$89,398.13
1880.....		241,235.91
1890.....		357,622.82
1891-1897.....	³ 189,742.17	502,234.70

¹ Includes grape juice or pulp from 1871 to 1883.

² Average annual value for three years, 1865, 1869, and 1870.

³ Average annual quantity for six years, 1892 to 1897, inclusive.

Imports of grapes, by years.

Year.	Quantity.	Value.
	<i>Barrels.</i>	
1891.....		\$534,820.80
1892.....	228,934.00	478,118.50
1893.....	158,869.57	485,763.50
1894.....	224,468.32	816,602.00
1895.....	149,791.91	335,110.00
1896.....	205,524.75	490,788.09
1897.....	170,864.51	374,440.03

On account of their firmness and long-keeping quality, these grapes occupy a position in our markets peculiar to themselves. At the present time they can hardly be said to compete with any domestic product, though by aid of refrigeration some of the meaty and late-ripening sorts of the *vinifera* type may be expected to lessen the demand for "Malagas" in future.

Though efforts at the commercial production of this type in California for shipment in the fresh state late in the season have not, up to the present time, been eminently successful, no adequate reason is known for believing that they will not be so in future when the climatic and soil conditions essential to their successful growth are better understood.

OLIVES AND OLIVE OIL.

Imports of olives were not scheduled until 1869, when they amounted to \$28,896.60. A rapid increase in the annual averages has occurred since that time, the maximum value for a single year being \$510,534.88 in 1893. Since then there has been a distinct diminution in the value imported, largely because of domestic production. The tables on page 330 show the average annual imports of olives by decades, 1870 to 1890, and imports by years, 1891 to 1897, inclusive.

Average annual imports of olives, by decades.

Decade ending--	Value.
1870.....	¹ \$23,130.32
1880.....	51,535.23
1890.....	133,019.48
1891-1897.....	375,511.03

¹ Average annual value for two years, 1869 and 1870.*Imports of olives, by years.*

Year.	Value.
1891.....	\$320,163.77
1892.....	417,881.55
1893.....	510,534.88
1894.....	378,863.41
1895.....	325,352.10
1896.....	347,344.70
1897.....	328,436.84

Olive oil was largely brought in at an early date, the imports of 1821 having been valued at more than one-fourth as much as all the fruit imports of the year. Previous to 1862 no distinction was made between oil suitable for food and the inferior grades, but so far as can be determined from the schedules there has been a much more rapid increase in the imports of salad oil than of the inferior grades since that time. The imports of salad oil for 1897 were considerably in excess of those of any former year, being valued at \$1,146,494.52. The following tables show the average annual imports of olive oil in casks, or other than salad, by decades, 1830 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of olive oil, by decades.

[In casks, or other than salad.]

Decade ending--	Quantity.	Value.
	<i>Gallons.</i>	
1830.....	77,523	¹ \$36,424.00
1840.....	197,191	² 147,006.00
1850.....	83,589	54,385.00
1860.....	131,944	92,475.00
1870.....	³ 155,849	³ 127,578.00
1880.....	121,678	90,301.00
1890.....	⁴ 556,149	511,140.00
1891-1897.....	696,512	321,588.00

¹ Average annual value for four years, 1821 to 1824, inclusive.² Average annual value for seven years, 1834 to 1840, inclusive.³ Average annual quantity and value for three years, 1862 to 1864, inclusive; includes quantity and value of all olive oil.⁴ Includes all olive oil for the seven years, 1884 to 1890, inclusive.

Imports of olive oil, by years.

[In casks, or other than salad.]

Year.	Quantity.	Value.
	<i>Gallons.</i>	
1891.....	709,496.19	\$458,079.55
1892.....	900,379.00	255,867.00
1893.....	986,379.00	481,171.00
1894.....	391,691.00	180,212.00
1895.....	829,889.00	338,909.00
1896.....	846,123.60	317,975.00
1897.....	525,630.00	220,903.00

The following tables show the average annual imports of olive oil in bottles, or suitable for salad, by decades, 1860 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of olive oil, by decades.

[In bottles, or suitable for salad.]

Decade ending—	Quantity.	Value.
1860.....dozens.	¹ 142,311.00	¹ \$297,266.00
1870.....gallons.	² 142,890.00	² 290,620.00
1880.....do.	183,248.00	336,555.00
1890.....do.	³ 236,307.00	³ 413,824.00
1891-1897.....do.	937,216.39	909,246.15

¹ Average annual quantity and value for six years, 1855 to 1860, inclusive.

² Average annual quantity and value for seven years, 1861 and 1865 to 1870, inclusive; quantity for 1861 stated in dozens.

³ Average annual quantity and value for three years, 1881 to 1883, inclusive.

Imports of olive oil, by years.

[In bottles, or suitable for salad.]

Year.	Quantity.	Value.
	<i>Gallons.</i>	
1891.....	395,731.42	\$518,190.89
1892.....	685,079.98	852,655.11
1893.....	663,759.51	902,078.45
1894.....	744,438.91	900,013.10
1895.....	777,047.54	953,832.65
1896.....	918,629.40	1,093,480.39
1897.....	945,828.00	1,146,494.52

As early as 1634 an attempt was made to introduce the olive to Virginia, and at frequent intervals down to the present century its culture was attempted at different points in that State. In 1755 it was

introduced at Charleston, S. C., by Henry Laurens, and again at the same point in 1785 by an incorporated society for the promotion of agriculture. In 1769 it was introduced by Dr. Turnbull, an Englishman, who founded a colony of Greeks and Minorcans at New Smyrna, Fla.; but nowhere in the Eastern States has it become of commercial importance.

In 1769 olive seeds were planted at San Diego, Cal., and some of the trees which grew from them are still in existence. These and others about the California missions demonstrated the suitability of the soil and climate to olive production at an early day, but not until after the American occupation of the Territory did olive culture assume commercial importance.

In 1872 Mr. Ellwood Cooper, of Santa Barbara, planted olive trees, from the fruit of which he made oil in 1876, and since that time the olive has become a favorite tree with planters in several counties in the State. Statistics of production are not obtainable, but the output of oil and pickled olives is increasing largely each year. It is estimated by the California Fruit Grower that there are 1,400,000 olive trees in orchard in California at the present time.

The superior cleanliness observed in the manufacture of oil in California, together with the guaranteed purity of the product, can hardly fail to cause the domestic article to largely supplant the imported oil in our markets in the near future. The consumption of pickled olives in the United States is increasing rapidly, and the recent introduction of the variety from which the celebrated "Queen" olives of Spain are made, together with the superior quality of the pickled ripe olives packed in California, are likely to result in the displacement of the imported article. Two varieties, the Mission and Sevillano, are illustrated on Pl. VI, specimens from John Rock, Niles, Cal., 1897.

MISCELLANEOUS FRUITS.

The following tables show the average annual imports of fruits not separately scheduled by decades, 1860 to 1890, and imports by years, 1891 to 1897, inclusive. The number of items included under each head has varied greatly at different times, and distinct comparisons of the periods specified can not be safely made.

Average annual imports of fruits in juice, and fruit juice, by decades.

Decade ending—	Value.
1870.....	¹ \$48, 146. 81
1880.....	106, 425. 70
1890.....	233, 219. 74
1891-1897.....	127, 753. 52

¹ Average annual value for six years, 1865 to 1870, inclusive.



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OLIVES.

Albion & Co Lith

1. MISSION.

2. SEVILLANO.

Imports of fruits in juice, and fruit juice, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891	240,089.96	\$52,199.22
1892		124,362.45
1893		84,394.90
1894		71,123.51
1895		131,692.08
1896		207,931.08
1897		222,571.48

Average annual imports of fruits preserved in brandy, sugar, etc., by decades.

Decade ending—	Value.
1860	¹ \$129,615.50
1870	181,937.15
1880	343,066.16
1890	620,641.28
1891-1897	561,903.70

¹ Average annual value for six years, 1855 to 1860, inclusive.

Imports of fruits preserved in brandy, sugar, etc., by years.

Year.	Value.
1891	\$368,960.94
1892	934,537.27
1893	780,352.44
1894	479,604.11
1895	479,400.21
1896	442,911.60
1897	447,559.30

Average annual imports of green, ripe, or dried fruits, not elsewhere scheduled, by decades.

Decade ending—	Value.
1860	¹ \$185,249.66
1870	84,704.89
1880	138,323.58
1890	374,675.49
1891-1897	405,420.15

¹ Average annual value for six years, 1855 to 1860, inclusive.

Imports of green, ripe, or dried fruits, not elsewhere scheduled, by years.

Year.	Value.
1891.....	\$335,711.22
1892.....	294,568.24
1893.....	435,716.38
1894.....	321,050.56
1895.....	361,894.09
1896.....	490,709.39
1897.....	398,291.23

NUTS AND NUT PRODUCTS.

ALMONDS.

The first nut imported in large quantity was the almond, of which 264,818 pounds were received in 1821. From that date until 1843 no other kind of nut is scheduled. In 1859 the imports had risen to 5,439,210 pounds, valued at \$444,757. Since 1865 shelled almonds have been separately scheduled, and the imports, in this form, which began with 116,899 pounds, valued at \$17,660, in that year, have risen to 5,798,354 pounds, valued at \$683,446.34, in 1897. The extraordinary increase since 1890 in the imports of shelled almonds, as compared with almonds not shelled, is believed to be largely due to the fact that the several rates of duty that have prevailed during that period have been proportionately higher on almonds not shelled than on shelled almonds. The following tables show the average annual imports of almonds by decades, 1830 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of almonds, by decades.

Decade ending-	Quantity.	Value.
	<i>Pounds.</i>	
1830.....	637,886	
1840.....	2,240,451	\$197,059.00
1850.....	1,493,682	113,840.00
1860.....	3,352,759	254,859.00
1870.....	2,290,157	234,021.00
1880.....	2,514,072	298,551.00
1890.....	3,121,444	309,318.00
1891-1897.....	3,500,835	264,218.73

¹ Average annual value for seven years, 1834 to 1840, inclusive.

Imports of almonds, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	3,390,924.50	\$292,510.85
1892.....	3,451,840.50	290,744.20
1893.....	2,780,011.00	270,742.00
1894.....	3,305,300.00	259,139.00
1895.....	4,178,419.00	281,296.21
1896.....	3,202,084.16	210,690.15
1897.....	4,196,609.00	244,406.07

Average annual imports of shelled almonds, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1870.....	640,530	\$107,743.00
1880.....	980,873	169,417.00
1890.....	1,684,410	276,470.00
1891-1897.....	4,020,227	611,908.00

¹ Average annual value for six years, 1885 to 1870, inclusive.

Imports of shelled almonds, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	3,046,750	\$615,418.97
1892.....	3,598,551	667,179.46
1893.....	3,758,500	664,562.27
1894.....	3,505,178	519,584.34
1895.....	4,188,831	561,064.67
1896.....	4,245,426	572,105.70
1897.....	5,798,354	683,446.34

On account of its close relationship to the peach, the almond was at one time regarded as a very promising tree for the Eastern United States. Previous to 1855, the Patent Office distributed an importation of soft-shelled almonds to growers throughout the Middle and Southern States. Its early blooming habit and susceptibility to injury by late frosts soon demonstrated the fact that though the tree succeeded it was valueless as a producer of nuts even in the Gulf States. In California many of the earlier efforts at commercial almond culture were unsuccessful, either because they were made with unreliable varieties or in unsuitable localities. But in 1885, when Mr. A. T. Hatch exhibited a collection of thin-shelled seedlings from the bitter almond which had proved to be of superior quality for market, and bore regular crops, new life was given to the industry.

The production in California now varies from 500,000 to 2,500,000 pounds per annum, and the quality of the product compares favorably with all but the best of the imported nuts. Specimens of a number of the leading varieties grown in that State from John Rock, Niles, 1897, A. T. Hatch, Suisun, 1891, and from Malaga, Spain, through Charles Heath, former United States consul at Catania, Sicily, 1892, are illustrated on Pl. VII.

Almonds are also successfully grown in rather limited areas in Texas, New Mexico, Arizona, Nevada, Utah, Idaho, and Oregon.

ALMOND OIL.

So far as known no almond oil is produced in the United States. The following tables show the average annual imports of almond oil by decades, 1870 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of sweet almond oil, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1870.....	¹ 15,228.00	¹ \$4,888.68
1880.....	25,165.00	9,203.39
1890.....	40,599.00	10,531.62
1891-1897.....	88,138.92	17,729.37

¹ Average annual quantity and value for eight years, 1863 to 1870, inclusive.

Imports of sweet almond oil, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	51,384.0	\$12,248.95
1892.....	90,670.5	13,636.36
1893.....	212,919.0	39,583.50
1894.....	59,730.0	12,682.45
1895.....	74,195.0	13,103.80
1896.....	71,480.0	13,791.00
1897.....	88,594.0	19,059.59

Average annual imports of bitter almond oil, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1880.....	3,454.76	\$11,428.45
1890.....	3,573.58	8,999.59
1891-1897.....	6,632.92	10,604.53



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ALMONDS.

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1. DRAKE. 1A. DRAKE KERNEL. 2. LANGUEDOC. 2A. LANGUEDOC KERNEL. 3. NONPAREIL. 3A. NONPAREIL KERNEL. 4. PRIMA. 4A. PRIMA KERNEL. 5. NE-PLUS-ULTRA. 5A. NE-PLUS-ULTRA KERNEL. 6. IXL. 6A. IXL. KERNEL. 7. JORDAN. 7A. JORDAN KERNEL.

Imports of bitter almond oil, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	4,795.00	\$9,958.00
1892.....	6,149.00	11,023.00
1893.....	8,165.80	11,532.89
1894.....	4,104.00	6,981.00
1895.....	6,549.00	10,566.00
1896.....	6,195.75	12,141.83
1897.....	10,471.90	12,029.00

FILBERTS AND WALNUTS.

These nuts have been scheduled together, beginning with 4,890,385 pounds, valued at \$118,721, in 1865. Since 1890 the shelled nuts have been separately scheduled. The greatest value imported in a single year was in 1891, when the imports of shelled and unshelled together amounted to \$953,082.84. The apparent decrease in imports since that year is undoubtedly due to the largely increased domestic production of walnuts. Filberts are not grown on a commercial scale in this country. The following tables show the average annual imports of filberts and walnuts by decades, 1870 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of filberts and walnuts, by decades.

Decade ending--	Quantity.	Value.
	<i>Pounds.</i>	
1870.....	¹ 3,903,921	¹ \$170,089.65
1880.....	4,902,243	289,823.57
1890.....	9,523,104	548,694.82
1891-1897.....	² 12,894,106	635,150.56

¹ Average annual quantity and value for six years, 1865 to 1870, inclusive.

² 1891 to 1897, exclusive of shelled filberts and walnuts.

Imports of filberts and walnuts, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	15,119,507.0	\$872,043.84
1892.....	12,302,096.0	647,628.55
1893.....	11,900,846.0	673,705.00
1894.....	10,122,079.5	450,834.99
1895.....	11,670,895.0	530,922.13
1896.....	16,226,147.0	638,060.46
1897.....	12,827,174.5	632,858.99

Average annual imports of filberts and walnuts, shelled,¹ 1891 to 1897.

Period.	Quantity.	Value.
	<i>Pounds.</i>	
1891-1897.....	1,186,735	\$134,374.35

Imports of filberts and walnuts, shelled, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	511,709	\$81,039.09
1892.....	863,309	98,417.00
1893.....	1,380,070	168,867.00
1894.....	1,008,626	116,573.00
1895.....	1,395,559	155,415.00
1896.....	1,658,069	169,014.50
1897.....	1,489,803	151,295.06

¹ Included with "filberts and walnuts" previous to 1891.

Although scattered trees of the Persian (English) walnut were planted in the Eastern United States at an early day, no commercial plantings resulted from them. Like the almond, their blossoms suffer from late frosts too frequently to permit regular crops, though in a few sheltered localities the trees are rarely injured, and are reasonably productive.

In California the walnut was introduced at the missions, and several commercial orchards are recorded by Lelong as having been planted from 1843 to 1865. The earlier plantings were of the "Mission," or "English" type, and in many localities the trees were found to lack productiveness. More recently, improved sorts producing more regular crops of "soft-shell" nuts were introduced, and since their general planting began walnut culture has greatly increased.

The crop of the State for 1896 was estimated to exceed 8,000,000 pounds, and is increasing steadily.

BRAZIL, OR CREAM, NUTS.

Brazil, or cream, nuts were first scheduled in 1873, when 3,690,908 pounds were imported, valued at \$170,628. The imports have fluctuated considerably from year to year, the greatest value, \$471,347, being in 1892. Since then they show a material decrease. The tables on page 339 show the average annual imports of Brazil, or cream, nuts by decades, 1880 and 1890, and imports by years, 1891 to 1897, inclusive.

Average annual imports of Brazil, or cream, nuts, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1880.....	¹ 2,975,738	¹ \$143,709.31
1890.....	² 3,802,009	188,613.32
1891-1897.....		330,514.71

¹ Average annual quantity and value for eight years, 1873 to 1880, inclusive.

² Average annual quantity for three years, 1881 to 1883, inclusive.

Imports of Brazil, or cream, nuts, by years.

Year.	Value.
1891.....	\$394,273.00
1892.....	471,347.00
1893.....	424,893.00
1894.....	345,615.00
1895.....	181,146.00
1896.....	261,357.00
1897.....	234,972.00

Brazil, or cream, nuts are the product of a tropical species, and are not grown in any portion of the United States.

COCOANUTS AND COCOANUT OIL.

Imports of cocoanuts amounted in 1861 to \$28,767, and show a great increase since that time. The following tables show the average annual imports of cocoanuts and cocoanut oil by decades, 1870 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of cocoanuts, by decades.

Decade ending—	Value.
1870.....	\$75,006.34
1880.....	302,296.81
1890.....	¹ 722,758.31
1891-1897.....	¹ 751,509.72

Imports of cocoanuts, by years.

Year.	Value.
1891.....	¹ \$922,257.33
1892.....	942,550.78
1893.....	901,234.45
1894.....	845,169.54
1895.....	512,218.24
1896.....	540,083.21
1897.....	597,045.51

¹ 1890 to 1897, inclusive, includes desiccated cocoanut, etc.

Average annual imports of cocoanut oil, by decades.

Decade ending—	Quantity.	Value.
1870 gallons..	¹ 61,402	¹ \$43,201.00
1880 do.....	² 247,517	² 134,891.61
1890 pounds..	³ 12,572,520	550,958.63
1891-1897 do.....	22,066,063	1,049,507.60

¹ Average annual quantity and value for two years, 1864 and 1865.² Average annual quantity and value for nine years, 1872 to 1890, inclusive.³ Average annual quantity for seven years, 1884 to 1890, inclusive.*Imports of cocoanut oil, by years.*

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	10,065,064	\$500,833.00
1892.....	22,142,856	1,287,990.00
1893.....	27,684,788	1,242,542.00
1894.....	16,262,392	785,988.28
1895.....	31,722,014	1,340,208.00
1896.....	27,407,234	1,165,114.00
1897.....	22,778,247	963,879.00

The domestic production of cocoanuts, which is confined to the coast region of lower Florida, is unimportant. Imports of cocoanut oil, which were valued in 1864 at \$23,942, rose to \$1,340,208 in 1895, but show a decline in 1896 and 1897.

PEANUTS.

The imports of "peanuts and other ground nuts," which at one time constituted an important item, valued at \$194,387 in 1864, have fallen to \$2,106.85 in 1897, while the imports of the shelled nuts have fallen from 1,104,018 pounds, valued at \$34,401 in 1872, to 1,060 pounds, valued at \$9.14 in 1897. These decreases are due to increased domestic production. The following tables show the average annual imports of peanuts by decades, 1870 to 1890, and imports by years, 1891 to 1897, inclusive:

Average annual imports of peanuts and other ground nuts, by decades.

Decade ending--	Quantity.	Value.
	<i>Pounds.</i>	
1870.....	¹ 6,522,844	² \$184,465.49
1880.....	1,849,645	46,662.16
1890.....	170,593	3,314.24
1891-1897.....	149,672	2,655.18

¹ Average annual quantity for six years, 1865 to 1870, inclusive.² Average annual value for seven years, 1864 to 1870, inclusive.

Imports of peanuts and other ground nuts, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	304,335	\$6,552.99
1892.....	128,360	3,661.68
1893.....	73,344	1,006.72
1894.....	110,369	1,682.62
1895.....	108,674	1,215.48
1896.....	189,520	2,359.61
1897.....	138,102	2,106.85

Average annual imports of shelled peanuts and other ground nuts, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1870.....	1,391,006	\$13,713.89
1880.....	375,342	14,974.95
1890.....	54,960	2,223.97
1891-1897.....	21,658	2,623.09

¹ Average annual quantity and value for five years, 1896 to 1870, inclusive.

Imports of shelled peanuts and other ground nuts, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	148,350	\$18,312.83
1892.....		
1893.....	25	2.20
1894.....	157	9.00
1895.....	1,773	24.22
1896.....	243	4.24
1897.....	1,060	9.14

"ALL OTHER NUTS NOT OTHERWISE PROVIDED FOR."

The number of items included under this head varies at different periods. In 1843, when the caption "all other nuts not otherwise provided for," was first used, it included all nuts but almonds, and amounted to 1,133,302 pounds, valued at \$54,535. Since then the more important kinds have been successively removed from this schedule. The most important item now included in it is probably the European chestnut, of which a considerable quantity is imported each year. The tables on page 342 show the average annual imports of "all other nuts not otherwise provided for" by decades, 1850 to 1890, and imports by years, 1891 to 1897, inclusive.

Average annual imports of "all other nuts not otherwise provided for," by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1850.....	¹ 2,456,890	¹ \$73,898.00
1860.....	² 4,927,624	173,494.00
1870.....	³ 2,156,176	124,119.00
1880.....	897,087	35,151.00
1890.....	808,068	32,461.00
1891-1897.....	1,944,493	61,678.91

¹ Average annual quantity and value for eight years, 1843 to 1850, inclusive.

² Average annual quantity for seven years, 1851 to 1857, inclusive.

³ Average annual quantity for seven years, 1862 and 1865 to 1870, inclusive.

Imports of "all other nuts not otherwise provided for," by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	1,629,355.0	\$54,156.45
1892.....	1,895,571.0	71,237.52
1893.....	1,891,979.0	72,359.83
1894.....	1,732,864.5	54,228.25
1895.....	1,652,184.0	48,618.49
1896.....	2,308,671.4	69,840.27
1897.....	2,410,832.0	61,311.58

The following table shows the imports of fruits and fruit products for 1897:

Imports of fruits and fruit products, 1897.

Fruits and fruit products.	Quantity.	Value.
Raisins.....pounds..	11,917,756.00	\$532,554.00
Currants.....do....	28,218,176.00	572,803.00
Plums and prunes.....do....	738,987.00	74,185.46
Figs.....do....	8,837,572.00	532,974.50
Dates.....do....	12,225,111.00	285,617.06
Tamarinds.....		2,699.00
Oranges.....		3,341,646.64
Lemons.....		4,025,354.49
Limes.....		28,700.29
Lemon and orange oil.....pounds..	304,270.90	270,423.82
Lemon, lime, and sour orange juice.....		74,848.00
Orange and lemon peel.....		28,436.00
Bananas.....		4,065,947.82
Plantains.....		27,244.76
Pineapples.....barrels..	271,635.53	338,619.53
Grapes.....do....	170,864.51	374,440.03
Olives.....		328,436.84
Olive oil (other than salad).....gallons..	525,630.00	220,908.00
Olive oil (suitable for salad).....do....	945,828.00	1,146,494.52
Fruits in juice, and fruit juice.....		222,571.48
Fruits preserved in brandy, etc.....		447,559.39
Fruits, green, ripe, or dried, not elsewhere specified.....		398,291.23
Total.....		17,300,360.86

The following table shows the imports of nuts and nut products for 1897:

Imports of nuts and nut products, 1897.

Nuts and nut products.	Quantity.	Value.
	<i>Pounds.</i>	
Almonds	4,196,009.00	\$24,408.07
Almonds (shelled)	5,798,354.00	683,446.34
Almond oil (sweet)	86,594.00	19,059.59
Almond oil (bitter)	10,471.90	12,029.00
Filberts and walnuts	12,827,174.50	632,858.99
Filberts and walnuts (shelled)	1,480,803.00	151,236.06
Brazil, or cream, nuts		234,972.00
Cocoanuts		597,045.51
Cocoanut oil	22,778,247.00	963,879.00
Peanuts	138,102.00	2,106.85
Peanuts (shelled)	1,060.00	9.14
All other nuts, not otherwise provided for	2,410,632.00	61,311.58
Total		3,602,421.13

The total value of the imports of fruits and fruit products and nuts and nut products in 1897 amounted to \$20,962,781.99.

EXPORTS OF FRUITS AND FRUIT PRODUCTS.

APPLES.

As has been noted, the apple was the first fruit exported. Aside from apples, fresh and dried, and vinegar (one of the chief apple products), no other fruit item was scheduled among exports until 1865. Beginning in 1821 with 68,643 bushels, valued at \$39,966, the annual averages, by decades, show a steady increase in the quantity of apples exported, with a slight decrease in value during the last period. The maximum quantity thus far shipped was in the fiscal year 1897, when 1,503,981 barrels, valued at \$2,371,143, were exported, though the greatest value (\$2,407,956) was in 1892.

Records of shipments during the latter part of the eighteenth century are lacking, but the New England export trade in ice, which began with the West Indies in 1805, was accompanied by shipments of apples on a large scale. Soon after the ice trade was extended to India and China, which was in 1830, New England apples could be had in the ice ports of those countries, and such is the case at the present time. According to the statement of B. G. Boswell, of New York,¹ in 1843, the fruit dealers of Boston had at that time been shipping apples and cranberries to Europe for many years. This writer commended the Baldwin and Newtown Pippin for the purpose, and emphasized the necessity for shipping none but "the very finest quality." The following tables show the average annual exports of apples and apple products by decades, 1830 to 1890, and exports by years, 1891 to 1897, inclusive.

¹ Transactions American Institute, 1843, p. 125.

Average annual exports of apples, by decades.

Decade ending—	Quantity.	Value.
	<i>Barrels.</i>	
1830.....	20,422	\$34,495.20
1840.....	18,525	37,031.70
1850.....	30,504	61,627.30
1860.....	38,800	104,107.90
1870.....	199,316	1,247,113.22
1880.....	196,310	584,701.60
1890.....	546,987	1,397,377.00
1891-1897.....	606,176	1,354,455.28

¹ Average annual quantity and value for nine years, 1861 to 1869, inclusive, and 1870.

Exports of apples, by years.

Year.	Quantity.	Value.
	<i>Barrels.</i>	
1891.....	135,207	\$476,897.00
1892.....	938,743	2,407,956.00
1893.....	408,014	1,097,967.00
1894.....	78,580	242,617.00
1895.....	818,711	1,954,318.00
1896.....	360,002	930,299.00
1897.....	1,503,981	2,371,143.00

Average annual exports of dried apples, by decades.

Decade ending—	Quantity.	Value.
	<i>Pounds.</i>	
1870.....	¹ 1,049,059	¹ \$113,681.00
1880.....	4,632,460	239,965.50
1890.....	13,305,097	773,507.60
1891-1897.....	15,483,143	784,246.57

¹ Average annual quantity and value for six years, 1864 to 1869, inclusive, and 1870.

Exports of dried apples, by years.

Year.	Quantity.	Value.
	<i>Pounds.</i>	
1891.....	6,973,168	\$409,605.00
1892.....	26,042,063	1,288,102.00
1893.....	7,966,819	482,065.00
1894.....	2,846,645	168,054.00
1895.....	7,085,946	461,214.00
1896.....	26,691,963	1,340,507.00
1897.....	30,775,401	1,340,159.00

Average annual exports of vinegar, by decades.

Decade ending—	Quantity.	Value.
	<i>Gallons.</i>	
1830.....		¹ \$6,502.00
1840.....		4,688.00
1850.....		11,956.00
1860.....	² 227,238	24,148.60
1870.....	³ 199,551	332,014.22
1880.....	21,875	6,188.70
1890.....	54,754	10,114.00
1891-1897.....	85,172	11,959.00

¹ Average annual value for five years, 1825 to 1830, inclusive.

² Average annual quantity for six years, 1855 to 1860, inclusive.

³ Average annual quantity and value for nine years, 1861 to 1869, inclusive, and 1870.

Exports of vinegar, by years.

Year.	Quantity.	Value.
	<i>Gallons.</i>	
1891.....	68,733	\$10,489.00
1892.....	74,890	11,690.00
1893.....	86,936	12,177.00
1894.....	68,282	9,537.00
1895.....	80,234	11,273.00
1896.....	123,163	16,975.00
1897.....	93,900	11,572.00

Average annual exports of cider, by decades.

Decade ending—	Quantity.	Value.
	<i>Gallons.</i>	
1880.....		¹ \$2,588.50
1890.....	388,453	60,498.40
1891-1897.....	564,356	77,052.85

¹ Average annual value for two years, 1879 to 1880, inclusive.

Exports of cider, by years.

Year.	Quantity.	Value.
	<i>Gallons.</i>	
1891.....	353,833	\$53,582.00
1892.....	722,959	101,710.00
1893.....	732,607	97,352.00
1894.....	400,690	65,686.00
1895.....	669,745	85,675.00
1896.....	372,966	47,670.00
1897.....	637,672	77,606.00

In 1845 it is stated¹ that the Newtown Pippins from the orchard of Robert L. Pell, of Ulster County, N. Y., sold in London at \$21 a barrel. The merchant to whom they were consigned wrote that the nobility and other people of great wealth bought them at retail at a guinea a dozen, or about 42 cents an apple. The next year, when his crop was estimated at from 3,000 to 4,000 barrels, the fruit sold upon arrival in New York at \$6 per barrel for shipment to England.

Mr. Pell's orchard of 20,000 trees of Yellow and Green Newtown became famous on account of the high prices received for its fruit, and in consequence the varieties mentioned were planted and grafted throughout the apple regions of the country. They did not prove equally successful elsewhere, however, except in the Piedmont and Mountain regions of Virginia and North Carolina, where the principal supply of "pippins" for export has for many years past been produced.

Patrick Barry, writing from London in 1849, in commenting on the American apples then for sale in that market, emphasized the importance of sending abroad none but carefully handled fruit of select varieties, and stated as his conclusion that "the Newtown Pippin and Roxbury Russet come nearer the English taste than any other varieties we cultivate." He predicted a profitable demand for American pears in England, saying: "If we ever succeed in raising pears beyond what may be required for home consumption, they will find market and good prices here. Not one person in a thousand, I might say five thousand, ever tastes a fine pear."² This prediction California growers and shippers are now endeavoring to verify.

The Newtown held its supremacy for many years, though other varieties were shipped in gradually increasing quantities, and in 1880 an unusually large crop of apples caused large shipments of many kinds to be made. The shipments of apples during the fiscal year 1881 amounted to 3,071,928 bushels, valued at \$2,301,334, and since that time the transatlantic trade in apples has been an important item in the export trade of the country. Until 1896 Great Britain was the only important customer, but shipments to Germany in that year have been followed by a large and growing demand, which promises well for the future.

Though the Eastern States still furnish the larger part of the apples exported, large shipments are now made from the great orchard districts of the Mississippi Valley, and some profitable shipments have recently been made from the Pacific Coast.

The export trade in dried apples was of considerable importance when the item first appeared in 1864. The shipments of that year amounted to 2,841,532 pounds, valued at \$246,051. The invention of the fruit evaporator, which was perfected about 1870-75, resulted in

¹ Genesee Farmer, November, 1845, p. 175.

² New England Farmer, Vol. I, 1849, p. 103, copied from Genesee Farmer.

a large increase of this product, as well as in a marked improvement in its quality. Foreign demand was accordingly stimulated, and in 1881 the exports of the great crop of 1880 were 22,623,652 pounds, valued at \$1,247,891.

Notwithstanding attempted discriminations against them by foreign Governments, the wholesomeness and cheapness of American dried apples have resulted in an increasing consumption abroad, as is evident by the large quantity, 30,755,401 pounds, valued at \$1,340,159, exported in 1897.

Exports of vinegar were at one time relatively important, the value, \$5,801, shipped in 1826 having been more than one-fifth of that of the apple exports of the same year. The maximum, \$46,100, was reached in 1865, since which time the item has been unimportant.

Cider was first itemized in 1879, and was then valued at \$1,462. Exports reached their highest point in 1889, when they were valued at \$122,476.

CANNED AND PRESERVED FRUITS.

Exports of fruits "preserved in cans or otherwise" are first noted in 1870, when their value was \$81,735. The tables indicate a large and reasonably steady growth since that time, the maximum thus far being \$1,686,723 in 1897.

Since 1884 "preserved fruits" have been separately scheduled, beginning with \$53,361 in that year. During 1892, 1893, and 1894 the shipments exceeded \$200,000 each year, but since 1895 they have declined to \$43,276 in 1897. The following tables show the average annual exports of canned and preserved fruits by decades, 1870 to 1890, and exports by years, 1891 to 1897, inclusive:

Average annual exports of canned fruits, by decades.¹

Decade ending—	Value.
1870.....	² \$81,735.00
1880.....	371,118.50
1890.....	638,010.80
1891-1897.....	1,142,221.71

¹ Includes fruit preserved in cans or otherwise, 1870 to 1893, inclusive.

² Value for one year, 1870.

Exports of canned fruits, by years.

Year.	Value.
1891.....	\$708,880.00
1892.....	1,558,820.00
1893.....	1,137,660.00
1894.....	660,723.00
1895.....	871,465.00
1896.....	1,376,281.00
1897.....	1,686,723.00

Average annual exports of "fruits preserved (other)" for decade ending 1890.

Decade ending—	Value.
1890	¹ \$45,501.00
1891-1897	129,339.85

¹ Average annual value for seven years, 1884 to 1890, inclusive.

Exports of "fruits preserved (other)," by years.

Year.	Value.
1891	\$93,996.00
1892	214,738.00
1893	224,381.00
1894	211,215.00
1895	47,420.00
1896	70,353.00
1897	43,276.00

ALL OTHER GREEN, RIPE, OR DRIED FRUITS.

Under this or a similar designation a varying number of items have been included since 1865.

Beginning with \$403,281 in 1865, the value did not exceed \$1,000,000 in any year until 1890, when it was \$1,003,846. Since that year it has risen, until in 1897 it reached \$2,172,199.

Much of this increase is undoubtedly due to the increasing export shipments of dried apricots, peaches, and prunes from California, and to the fresh fruits, especially peaches, plums, pears, and oranges, which have been shipped to Europe from that State since 1891. The following tables show the average annual exports of green, ripe, or dried fruits, not elsewhere scheduled, by decades, 1870 to 1890, and exports by years, 1891 to 1897, inclusive.

Average annual exports of green, ripe, or dried fruits, not elsewhere scheduled, by decades.

Decade ending—	Value.
1870	¹ \$23,496.50
1880	237,666.90
1890	458,233.10
1891-1897	1,322,356.57

¹ Average annual value for six years, 1865 to 1870, inclusive. Amount for 1860 includes "fruits of all kinds."

Exports of green, ripe, or dried fruits, not elsewhere scheduled, by years.

Year.	Value.
1891.....	\$999,798.00
1892.....	1,005,845.00
1893.....	881,804.00
1894.....	1,016,397.00
1895.....	1,522,100.00
1896.....	1,808,353.00
1897.....	2,172,199.00

EXPORTS OF NUTS.

Exports of nuts are not mentioned until 1888, when they amounted to \$27,784. The increase since that time has been reasonably steady, and the shipments in 1897 reached a value of \$125,805.

Pecans and shagbarks, which are largely used by confectioners, probably constitute the more important items under this head. The following tables show the average annual exports of nuts for the decade ending 1890 and exports by years, 1891 to 1897, inclusive:

Average annual exports of nuts¹ for decade ending 1890.

Decade ending—	Value.
1890.....	² \$29,335.00
1891-1897.....	95,114.00

¹ Included with all other green, ripe, or dried fruits previous to 1888.

² Average annual exports for three years, 1888 to 1890, inclusive.

Exports of nuts, by years.

Year.	Value.
1891.....	\$50,617.00
1892.....	60,684.00
1893.....	94,902.00
1894.....	125,233.00
1895.....	115,274.00
1896.....	93,283.00
1897.....	125,805.00

HISTORICAL AND DESCRIPTIVE NOTES ON TEN VARIETIES OF THE
APPLE SUITABLE FOR THE EXPORT TRADE.

American apple growers long ago learned that comparatively few varieties are suited to the requirements of the commercial orchard. Many of those which are of the highest quality for dessert use are prevented by delicate texture, unattractive color, inferior size, unsuitable season of ripening, or insufficient productiveness from becoming profitable varieties even for domestic markets.

In the export trade the requirements are still more exacting, and but a few of the reputable varieties of our home markets have been found suitable for transatlantic shipment and sale. Of the thousand or more varieties now propagated and for sale by American nurserymen, it is doubtful if more than twenty have been found adapted to the export trade as now conducted.

For the guidance of prospective planters the following notes on ten of the leading export varieties have been prepared:

BALDWIN.

The Baldwin apple, which has been for more than half a century the leading market variety of the New England States, originated as a chance seedling in a lane on the farm of Mr. John Ball, in the town of Wilmington, near Lowell, Mass., and bore its first fruit about the middle of the eighteenth century. For many years after the original tree came into bearing the variety was confined to the immediate neighborhood of its origin. Having attracted the attention of Colonel Baldwin, of Woburn, Mass., it was propagated by him, and was rapidly disseminated throughout the adjoining towns. Before the middle of the present century it had become the leading variety in New England nurseries. At about the same time it became popular in New York and soon after this in Michigan. It was at one time considerably planted farther south, but has been generally discarded as a market variety south of latitude 40° N., where the fruit ripens prematurely and does not keep well. It has not proved successful between the Mississippi River and the Rocky Mountains, but succeeds well in the cooler apple districts of Colorado, Nevada, Utah, Idaho, Washington, Oregon, and California.

The tree is a vigorous grower, with a roundish, upright, rather compact head. It is productive, but it is much inclined to overbear in alternate years and to produce only a light crop in the succeeding years. In recent years it has been found quite susceptible to injury by apple scab, which has materially reduced the yield and value of its fruit in the large commercial orchards of New York and Michigan, where it is now most largely planted.

The fruit is large, roundish-conical, often oblate, and sometimes unequal in form. The cavity is of medium size and depth, and is

usually wavy and russeted; the stem varies from medium to long and is often clubbed at its attachment to the branch. The basin is of medium size, usually deep and ribbed; the eye variable, from small to large in size and from tightly closed to open, as grown in different climates. The surface is smooth, with a rich yellow ground color, which, on the exposed portions of the fruit is covered at maturity with a deep, rich red which is indistinctly striped with darker red. It is often slightly russeted, especially toward the base of the fruit. The dots are small, yellow, often russeted, and they are frequently depressed toward the apex of the fruit. The skin is rather thick and tough; the flesh yellowish-white, rather coarse, breaking and juicy, with a sprightly, subacid flavor, and a slight astringence, which is characteristic of the variety. The core is medium, round, closed, meeting or clasping the eye; seeds long, pointed. The quality varies considerably in the various apple sections, but in the Northern States, where it is now chiefly planted, it is entitled to rank as "good" for dessert and "very good" for culinary use. Its season is from December to March in ordinary cellar storage in the North.

Its special merits as an export variety are its productiveness, bright color, tough skin (which prevents injury from bruising during packing and while in transit), and its excellent keeping quality when grown in the North.

Its most apparent defects are, susceptibility to injury of both foliage and fruit by apple scab and injury of the fruit by "dry rot."

BEN DAVIS.

The origin of this apple, which is now more extensively planted in commercial orchards in the United States than any other variety, is in doubt. Several statements have been published concerning it from time to time, the more credible pointing toward Virginia or Tennessee as its original home. It was widely disseminated through Virginia, Tennessee, Kentucky, southern Ohio, Indiana, and Illinois before 1850, and was brought to the attention of pomologists at about that time by Mr. J. S. Downer, of Todd County, Ky. Though not of high dessert quality, the variety possesses so many valuable characteristics that it has steadily grown in favor among commercial orchardists from Maryland, Virginia, and North Carolina westward. Farther north, in the apple-growing districts where Baldwin and Northern Spy are the leading varieties, Ben Davis is less highly esteemed, as the growing season there is too short to permit the proper maturing of its fruit.

The tree is an upright and vigorous, though somewhat straggling, grower, and is a prolific bearer from an early age.

The fruit is large, varying from roundish oblate to cylindrical truncate in form, and is usually regular. The cavity is deep, acute, and russeted, the stem rather slender and varying from medium to long.

The basin is usually wide and moderately deep, of a peculiar saucer form, which is a strongly marked characteristic of the variety; the eye medium, partially open.

The surface is smooth, often glossy, and is of a rich yellow color, mostly covered with stripes and splashes of light and dark red. The dots are usually small and scattered. The core is of medium size, conical, regular, clasping the eye. The flesh is whitish, breaking, rather tough until fully ripe. The flavor varies from a distinct acid to subacid. In quality the fruit is better adapted to culinary than dessert use. It is specially esteemed for pie making and yields a handsome product when evaporated.

The fruit is easily kept until March in ordinary storage wherever it goes into winter in sound condition, and it stands cold storage and long shipment better than most other varieties.

The toughness of skin and flesh renders the fruit of Ben Davis less liable to injury from bruises than other varieties, so that it rarely becomes "slack" in the barrels unless very carelessly packed and handled.

Though sometimes injured by scab in the North it is rarely injured by this or any other serious disease in the Middle Atlantic and Prairie States, where it is most largely planted. The low dessert quality of the fruit is the chief menace to its future popularity.

JONATHAN.

This apple originated on the farm of Philip Rick, of Woodstock, Ulster County, N. Y. The name Jonathan was applied to it by the late Judge Buel, in honor of Jonathan Hasbrouck, esq., who called his attention to the variety. Judge Buel sent specimens of it to the Massachusetts Horticultural Society in 1829, stating that it was "an Esopus seedling, and sometimes called the New Spitzenberg."

It was rapidly disseminated after this time and was highly praised for its productiveness, beauty, and pleasant flavor in the horticultural periodicals of that time. As a market variety the Jonathan seems to have gained higher repute in the West, where it is now most largely planted, than in New York or New England. It was introduced to southern Iowa as early as 1842 and soon became, as it still continues, a leading market sort. Though rarely attaining large size it is so beautiful in form and color that it continues to gain in popularity where it succeeds, particularly in portions of Michigan, Iowa, Kansas, Colorado, Nevada, Idaho, and in the mountain orchards of the Pacific slope.

Though only an early winter sort, it has been found to keep fairly well in cold storage and to sell readily at high prices in British markets.

The tree is of rather slender growth and spreading, rather drooping, habit. It is productive, bearing heavy crops in alternate years.

It often succeeds better when top grafted on a strong growing stock than as a root-grafted tree.

The fruit is of medium size, varying in form from roundish conical to cylindrical. Both cavity and basin are deep, acute, and regular, the former slightly russeted; the stem slender and of medium length; the eye small and closed. The skin is thin but quite tough, and is very smooth, having a few minute dots. The color is a clear, whitish yellow, so thickly covered with clear red stripes that it often appears to be a dark, solid red, except where shaded by a leaf or twig which discloses the ground color, affording a most beautiful contrast. The core is small to medium in size, roundish, regular, closed, barely clasping the eye, and containing numerous rather large, angular, brown seeds; the flesh is white, often faintly tinged with red; very tender and juicy, with a mild aromatic flavor similar to, but less pronounced than *Esopus Spitzenburgh*, its supposed parent. In quality it is very good.

It is preeminently an apple for dessert use in the fresh state, and by its beauty and convenient size is particularly adapted for sale in small lots from stands and stores for immediate consumption. It is a late autumn or early winter variety except in the more northern districts, and is inclined to wilt and wrinkle in ordinary storage after New Year's, but in cold storage it is successfully held to a much later date.

Because of its tender flesh and thin skin, special care in picking, handling, and packing are imperative in marketing the Jonathan. It is easily bruised, and its market value is materially lessened by careless handling.

NORTHERN SPY.

This popular dessert apple originated in East Bloomfield, Monroe County, N. Y., about the year 1800, from apple seeds taken there from northwestern Connecticut. The original seedling tree was planted in the orchard of Heman Chapin, but died before bearing fruit. Suckers which had been taken from it by Roswell Humphrey and planted in his orchard were the first to bear, and to him, therefore, we owe the preservation and dissemination of the variety. It was not disseminated outside of its original locality until about 1840, when fine specimens of the fruit exhibited at Rochester attracted the attention of nurserymen and cultivators. It was highly commended and largely propagated after this time and soon became widely disseminated. Its fruit is highly esteemed wherever grown, but in the Southern apple districts it has been found to mature too early to be a profitable market sort.

The tree is a vigorous, upright grower, with a compact round head, which requires much thinning out to insure proper ripening of the fruit. The young wood is rather slender and the leaves of medium size. The variety is slow to come into bearing and is inclined to bear heavy crops, alternating with very light ones, after it reaches an age

of 15 or 20 years. The tree is resistant to cold and is esteemed as a stock for grafting feeble varieties upon.

The fruit is large, varying in form from roundish conical to oblate conical, often distinctly angular. The cavity is large, wide, and deep, usually angular, sometimes russeted, and contains a stem of medium length. The basin is small and abrupt, containing the small, closed eye. The surface is very smooth, having a few scattered, small dots, and is yellow, nearly covered with bright, glossy red, splashed and striped with purplish crimson and partially covered with a thin white bloom. The skin is thin but quite tough; the core of medium size, rather open, containing numerous small pointed seeds. The flesh is yellowish, fine grained, breaking juicy, having a sprightly subacid aromatic flavor, highly regarded for the dessert.

In the North the fruit keeps well until late spring in ordinary cellars, but its delicate flavor is quickly destroyed by contact with earth or decayed fruit. It endures cold storage well but is inclined to shrink in the barrels somewhat, necessitating repacking for shipment after being removed from storage.

RHODE ISLAND.

The Rhode Island *Greening*, as it is very generally known, has for nearly a century been held in high esteem as a dessert and culinary apple in the New England and Middle Atlantic States.

It was included in the list of "long-keeping apples" recommended for cultivation by McMahon in 1806,¹ though the earliest description was by Coxe in 1817. The place of its origin is not definitely known, though it has been generally credited to Rhode Island since the days of McMahon and Coxe. Having been widely distributed in the East, it was taken to Marietta, Ohio, from Connecticut in 1796, and soon became popular there for family use. The hotter sun and greater variation in temperature in its new home soon demonstrated that it was only an autumn fruit in the West, however, and it is now but rarely planted in commercial orchards south of Michigan.

As an apple for culinary use it may be said to stand without a rival during its proper season among the sorts now planted in commercial orchards, while it is at the same time of excellent dessert quality. These characteristics have served to partially maintain its market standing in competition with the more brilliant and handsome varieties of recent introduction. It now sells for lower prices than the red varieties both in domestic and foreign markets, however, and in seasons when the apple supply is large meets with little export demand.

The tree is a vigorous grower, with large leaves, stout wood, and spreading habit. It has been found specially adapted to light and sandy soils and cool summer climates, such as are found in portions of New England and New York and in proximity to the Great Lakes.

¹American Gardener's Calendar, p. 535.

It is regularly and abundantly productive, and, though often injured in quality by apple scab, is less subject to total loss of crop by that disease than most of the Northern winter varieties.

The fruit is large, oblate, somewhat conical, often irregular and unequal; cavity wide and regular, of medium depth, stem medium to long, curved; basin small to medium, regular, shallow, usually thinly russeted; eye small, closed. The surface is somewhat roughened by russet, but possesses an oily or waxy feel when mature; dots irregular, numerous, gray; color green, changing to dark, dull yellow when ripe, sometimes with a bronze blush on the sunny side. The skin is rather thick and quite tough; the core roundish oval, regular, closed, clasping; seeds numerous, angular, dark. The flesh is yellow, breaking, tender, juicy, with a rich, sprightly, subacid flavor, good for dessert and excellent for cooking. Its season of maturity varies according to latitude, from late autumn until midwinter or early spring. It endures handling and transportation well.

ROXBURY.

The apple widely known as Roxbury *Russet* is believed to have originated in Roxbury, Mass., soon after the settlement of the country. Scions of it were taken from there to Stonington, Conn., soon after the settlement of that place in 1649, and it was soon widely planted in eastern Connecticut.¹ Scions of it were taken from the orchard of General Israel Putnam (the wolf killer) in Pomfret, Conn., to the then new settlement at Marietta, where they were grafted in 1796 in the first nursery in Ohio, which had been established by his sons in 1794. From this point the variety became widely distributed under the name *Putnam Russet*, and was for many years considered a distinct variety. Under this name it was considerably grown in Ohio for the markets of New Orleans and the West Indies.² It was largely grown for market and exportation in the vicinity of Boston at an early day on account of its productiveness and long-keeping quality.³ Its reputation as a profitable orchard variety caused it to be widely planted previous to 1870, but since that time it has declined in popularity.

In the more Southern districts it has, like most other sorts of Northern origin, been found to ripen prematurely. In the North it still succeeds, but its dull color and rather inferior flavor have materially lowered its market value. In common with other russet apples of inferior dessert quality, it seems destined to be superseded by more handsome if not better sorts.

The tree is moderately vigorous, of spreading habit, and is very productive.

¹ History of the Massachusetts Horticultural Society, p. 43.

² The Fruits and Fruit Trees of America, A. J. Downing, fifth edition, 1845, p. 132.

³ New American Orchardist, William Kenrick, seventh edition, 1845, p. 80.

The fruit is medium to large, roundish oblate, often angular and oblique. The cavity is of medium size, regular, abrupt but not deep; stem of medium length, rather slender; basin of medium size, round, regular; eye medium, closed. The surface is rather rough, brownish yellow when ripe, with minute light dots, and is usually well covered with russet, though exceedingly variable in this respect, specimens from the Rocky Mountains and Pacific slope being almost entirely free from russet. Occasional specimens show a faint blush on the side exposed to the sun. The skin is moderately thick and tough, the flesh greenish white, rather coarse and granular, and moderately juicy. The core is of medium size, regular, closed, clasping, with numerous angular seeds, many of which are imperfect. In flavor the Roxbury is rather acid for dessert, though excellent for cooking.

TOMPKINS KING.

This apple, which is highly esteemed in the markets both at home and abroad, is of uncertain origin, though the more definite statements concerning it all point toward New Jersey. According to a writer in the *Country Gentleman*,¹ it originated in the Harrison orchard in Essex County, N. J., from which also came the one-time celebrated Harrison cider apple. From there it was taken in the form of scions in 1806 to Jacksonville, Tompkins County, N. Y., where a single graft set on a tree on the farm of Mr. James Wyckoff survived. Trees grafted from this in 1832 bore a heavy crop in 1838, and attracted such attention in the markets of Ithaca and Elmira that the variety quickly became popular and was rapidly disseminated throughout that vicinity. In 1856 it was stated in a discussion at the Rochester meeting of the American Pomological Society that the "Tompkins County King," as it was then designated, had been in cultivation for fifty years and was a general favorite wherever known, usually bringing double the price that could be obtained for any other sort.²

It was not considered sufficiently tested to recommend for general planting at this time, however, but was added to the list of "New varieties which promise well." Shortly before this it had been disseminated westward in an experimental way, and had been described as "King" by Elliott in 1854.³

Notwithstanding its large size and beauty, it soon lost popularity in the West and South because of the premature ripening and dropping of its fruit. It is found to succeed admirably in Michigan, northern New York, and New England, however, as well as in the neighboring provinces of Ontario and Nova Scotia, and is now largely exported from most of these localities.

¹ 1854, p. 234.

² Proceedings Am. Pom. Soc. 1856, pp. 173-174.

³ Western Fruit Book, p. 142.

The tree is a vigorous, spreading grower, with large, stout shoots and leaves. It is moderately productive.

The fruit is large and varies from round to oblate conical, and is usually angular; the cavity is of medium size and depth, usually smooth and free from russet, the stem of medium length, thick, and often clubbed. The basin is of medium size, rather shallow, and usually corrugated; the eye medium, closed. In color the apple is a deep, rich yellow, shaded with red and striped with crimson. The flesh is yellowish, rather coarse, juicy, and tender, with an agreeable, sprightly subacid, aromatic flavor. The skin is rather thick, and but moderately smooth, having numerous gray dots and russet veinings. It is very good in quality both for dessert and culinary use. It ships and keeps well in the North until late winter, but has been discarded in the South and West on account of the early maturing of its fruit, already mentioned.

WINESAP.

The Winesap was described by Coxé in 1817¹ as one of the best cider and eating apples of his region (western New Jersey). No authentic account of its origin has been discovered, but it is supposed to have originated in New Jersey. It became a popular apple through Delaware, Maryland, and Virginia at an early day, and was soon disseminated westward to Tennessee, Kentucky, Arkansas, Missouri, and Kansas. More recently it has been quite largely planted in the Rocky Mountain apple districts and in portions of California.

The tree is moderately vigorous, with a rather open, straggling head. It is an early bearer and is very productive, but is inclined to overbear and go into premature decay in consequence.

The fruit is of medium size, roundish conical, often angular or slightly ribbed. The cavity is large, regular, deep, and slightly russeted, the stem short and usually slender. The basin is of medium size, rather deep and abrupt, usually corrugated; the eye small and closed. The surface is smooth and of a rich, dark yellow color, mostly covered with dark red, sometimes faintly striped and often veined with russet toward the base of the fruit. The dots are rather scarce, and small, indented toward the apex, but distinctly elongated toward the base.

The skin is moderately thick and is very tough; core medium, conical, clasping, slightly open; seeds few, medium, brown; flesh yellowish, fine grained, firm, breaking; flavor sprightly subacid to distinctly acid; quality good for market, dessert, or culinary use.

The Winesap is an excellent keeper when well handled, being at its best from January to March when grown and stored in Virginia, Tennessee, and Kansas. As commonly grown it is rather under size

¹ A View of the Cultivation of Fruit Trees, etc., pp. 153-154.

for export sale, but the fruit from young trees, which have not been exhausted by overbearing, is large, carries well, and sells at high prices. This is especially true of the choice fruit of this sort from the Piedmont region of Virginia.

Several known or supposed seedlings of Winesap, including Stayman, Paragon, and Arkansas, are of larger size than the parent variety and are considered superior to it in vigor of tree. They may be considered as promising varieties for export which have not yet been sufficiently tested to establish their superiority to the parent in this respect.

YELLOW NEWTOWN.

As has been previously noted (p. 311), the "Newtown Pippin" was the first American apple which attracted attention in Europe. After the receipt of specimens by Franklin while in London in 1759, and the subsequent sending of grafts to Collinson by John Bartram, numerous attempts were made to grow the variety in England. As early as 1768 it was cultivated in the Brompton Park nursery under the name "Newtown Pippin of New York."¹

It is probable that the large apple exports of 1773 included considerable quantities of the Newtown, for it was at that time quite generally distributed through the apple-growing districts of the Atlantic slope. Thomas Jefferson recorded in his "Garden Book" that in March, 1773, grafts of "Newtown Pippin," received from Mordecai Debnam, at Sandy Point, were "ingrafted by P. Morton," and in March, 1778, he noted that the grafted trees were planted out at Monticello.

Prior to 1803 Forsyth said of the variety in England,² "The Newtown Pippin is a fine apple in good season, but seldom ripens with us. It is held in great esteem in America." McMahon³ in 1806 included Newtown Pippin in his select list of "Long-keeping apples" and also in a list of "Cyder apples."

Previous to 1817 we have no record that more than one type of the Newtown was recognized, but Coxse,⁴ whose work appeared in that year, described as distinct varieties the "Large Yellow Newton Pippin" and the "Green Newton Pippin," characterizing the latter as "a variety of the preceding kind." Since the time of Coxse the two types have been recognized as distinct by our leading American pomologists, though fruit growers are by no means unanimous on this point.

The original seedling tree of Newtown Pippin is alleged to have

¹ The Apple and Its Varieties, Robert Hogg, p. 143, London, 1859.

² A Treatise on the Culture and Management of Fruit Trees. Edition with American Notes, by William Cobbett, Albany, 1803, p. 58.

³ The American Gardener's Calendar, Bernard McMahon, p. 585, Philadelphia, 1806.

⁴ A View of the Cultivation of Fruit Trees, by William Coxse, esq., pp. 142-143, Philadelphia, 1817.

stood near a swamp on the estate of Gershom Moore, in Newtown, Long Island, until about 1805, when it died from excessive cutting of scions and exhaustion. Its origin is credited to the early part of the eighteenth century. It is not clear at this time whether the original tree was of the "green" or the "yellow" type, nor has any record of a distinct origin of the two been discovered.

The Yellow Newtown has for many years been considered the better apple for exportation, however, and in commercial orchards has almost superseded the Green Newtown on account of its larger size, brighter color, and better keeping quality.

Both sorts are exceedingly variable and susceptible to the influence of soil, climate, elevation above sea level, etc. They are successfully grown in but few portions of the apple-producing area of the United States at the present time, the principal localities being the lower portion of the Hudson River Valley in New York, the Piedmont and mountain regions of Virginia and North Carolina, and portions of California, Oregon, and Washington.

Though first grown in commercial orchards in New York, New Jersey, and Pennsylvania, the excellent quality of the fruit from "some of the Patowmack counties of Virginia" was noted as early as the time of Coxe.¹

In Albemarle County, Va., where it reached a high degree of perfection, it became known as the "*Albemarle Pippin*" at an early day, and was for many years considered a distinct variety, of local origin, and was so propagated.

An export trade in the fruit from Albemarle County was inaugurated under favorable auspices by a happy circumstance which occurred in the first year of the reign of Queen Victoria. The following account is kindly furnished by Mr. Samuel B. Woods, president of the Virginia Horticultural Society:²

The true history of the matter is that in the first year of Queen Victoria's reign Andrew Stevenson, whose home was on a mountain side in Albemarle, was minister to the Court of St. James. He had Albemarle Pippins sent over for his own use and presented the Queen with several barrels. She was delighted with the perfect flavor and excellence of the fruit, and, as a graceful acknowledgment of the courtesy of Mr. Stevenson, removed from Albemarle Pippins a small tax which then existed for the benefit of the Crown on all imported apples. From this time the Albemarle Pippin has grown steadily in favor in the English markets. It is not unusual to see them selling in the wholesale markets at Liverpool for two or three times the price other American apples are bringing. A neighbor last fall sold his entire crop for \$10 per barrel, and Mr. Whately, an English gentleman who recently returned from abroad, told me that he saw Albemarle Pippins retailing at 36 cents a pound.

The identity of Albemarle and Yellow Newtown seems to have been recorded first by the late Franklin Davis in a letter from Staunton, Va., which was published in the *Horticulturist* in 1857.³ Since that

¹ View of the Cultivation of Fruit Trees, p. 143.

² Letter of April 30, 1898.

³ *Horticulturist*, Vol. VII (1857), p. 288.

time most pomologists have accepted their identity, ascribing the slight variations which are observable to local soil or climatic conditions. But in the absence of an authentic record of the introduction of Yellow Newtown to Albemarle County many orchardists in the Piedmont and mountain regions have continued to believe the Albemarle a distinct variety of local origin. Recent investigation by Messrs. H. L. Lyman and Samuel B. Woods, prominent citizens and fruit growers of Charlottesville, Va., have resulted in an apparent clearing up of the historical uncertainty and establishing a clear connection between the supposed original Albemarle tree and the older variety. The following statement has been kindly furnished by Mr. Woods:¹

As far back as 1765 there was a tree noted for its fine fruit standing in a mountain hollow on what is now Mr. William Sutherland's land, in the North Garden neighborhood. How this tree came here no one knows, but tradition has it that it was a seedling, and from its stock came all Albemarle Pippins.

The other account, and the most authentic one, is that which fixes the earliest introduction at the time of Braddock's defeat. Dr. Thomas Walker, of Castle Hill, Albemarle County, was the commissary officer of the Virginia troops with Braddock, and after the disastrous defeat, when the remnant of the troops went into winter quarters in Philadelphia, he returned home, carrying in his saddlebags cuttings of apple trees. These were grafted at Castle Hill and became the famous Albemarle Pippin.

These two accounts I find connected in this rather curious way: The land on which the tree in the North Garden neighborhood stood was entered in the land office in 1741 in the name of Mildred Meriwether, in whose lifetime parts of the tract were improved. Mildred Meriwether was the stepdaughter of Dr. Thomas Walker, and what is more natural than that the old tree on her land, supposed to be a seedling, was one of the Walker grafts? There is little doubt that the first appearance of the Albemarle Pippin was at Castle Hill from the grafts brought home from Pennsylvania by Dr. Walker after Braddock's defeat in 1755.

The tree is rather slender and of slow growth, becoming large and spreading as it attains age, and is characterized even when young by rough bark. It is slow to begin bearing, but in favorable locations is abundantly productive after it attains an age of fifteen or twenty years.

In the Northern States it has generally been found most successful on rich limestone soils, though the famous "pippins" of Virginia and North Carolina are mostly grown upon the loose, friable, granitic soil of warm mountain coves.

The fruit is medium to large, roundish oblate, conical, sometimes cylindrical truncated and angular, often unequal or oblique; cavity deep, acute, russeted; stem short or medium, often clubbed; basin broad, shallow, or medium in depth, usually furrowed; eye, medium, partially open, the calyx segments becoming dry and brown toward spring; surface smooth, yellowish green, showing a bronze blush toward the apex in highly colored specimens and numerous gray striae

¹ Letter of April 30, 1898.

toward the base; dots numerous, minute, yellow or brown, some aureole. The skin is rather thick and tough; core small to medium, oval, closed, clasping the eye; seeds large, plump, pointed, brown; flesh yellowish, moderately fine, crisp, breaking, juicy, with a rich, subacid, aromatic flavor. Very good for either dessert or market.

The apple is in season from December to April or May, in most regions where it succeeds, retaining its characteristic flavor much later in the spring than most varieties of high dessert quality.

Notwithstanding the firmness of its flesh and skin, the Yellow Newtown shows bruises very distinctly and requires very careful handling and packing. It is also often injured in appearance by "barrel scald."

The special demand for it is for barrels of bright and perfect specimens. For these very high prices are often realized. Bruised, discolored, or inferior fruit of this kind meets with little demand and often brings less in the markets than a corresponding quality of Baldwin, Ben Davis, York Imperial, or Winesap. Its production is therefore not likely to become profitable except where it can be grown to a high state of perfection and when it is carefully handled.

YORK IMPERIAL.¹

The variety bearing this name originated early in the present century on a farm adjoining the then borough of York, Pa. The attention of the owner, a Mr. Johnson, was attracted to the tree by the presence of schoolboys who visited it in early spring to get the apples that had passed the winter on the ground, covered by leaves. On securing some of the fruit he found it in fine condition, and when the next crop was ripe took specimens to Mr. Jonathan Jessop, a local nurseryman, who began the propagation of the variety before 1830, under the name "Johnson's Fine Winter." Under this name it was known until after the middle of the century, when, after an inspection of specimens, the late Charles Downing pronounced it the "imperial of keepers" and suggested that it be named "York Imperial." Mr. Jessop did not find ready sale for trees of the variety at first, and dumped the surplus trees from his nursery into a hollow beside the turnpike passing his place. They were picked up by farmers returning from market and taken home for planting on their farms in the lower end of York County. After its merit as a variety for market orchards was established it became widely distributed throughout Pennsylvania, Maryland, and Virginia, and soon became a leading market variety in those States. So far as known, the variety was first described in print by Dr. W. D. Brincklée in 1853.²

¹For the historical statements on the origin and name of this variety the writer is indebted to Prof. S. B. Heiges, late Pomologist of the Department of Agriculture.

²Magazine of Horticulture, 1853, p. 210.

Warder states that specimens of it were exhibited at the meeting of the Ohio State Pomological Society in 1855, but it does not seem to have become generally popular west of the Alleghany Mountains until a comparatively recent date. Since about 1880 it has been widely disseminated through the Middle Western States and has become one of the leading market varieties of that region.

The fruit varies from medium to large in size, and is roundish oblate, often oblique, in form. The cavity is usually of medium size, depth, and slope, slightly marked with russet; the stem is commonly short and moderately stout. The basin is regular, deep, and slightly leather cracked; the eye usually small and tightly closed. The surface of the fruit is smooth, light yellow, washed and indistinctly striped with bright red in the sun, overspread with gray and sparingly sprinkled with distinct, large, light dots.

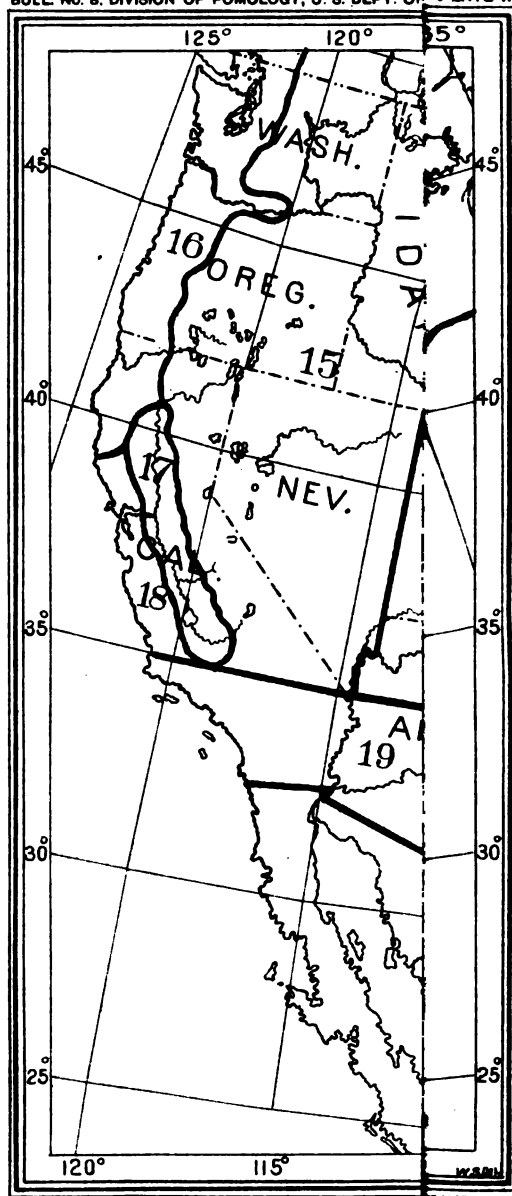
The skin is thin and tough; the core small to medium, open, with numerous seeds; the flesh yellowish, crisp, juicy; the flavor a pleasant, mild, subacid; the quality good to very good.

In season this apple is at its best from November to February in the regions where it is chiefly grown. Its productiveness, uniform size, bright color, and fair quality are its chief merits. The oblique form lessens its value for evaporating, as the difficulty of paring by machines is increased thereby. The fruit is often injured in appearance by "barrel scald" in storage, but the quality is hardly affected by it.

Since 1895 York Imperial has been growing in favor with the export trade, and selected fruit from orchards of the Piedmont region of Virginia has been sold at high prices both in British and German markets.

A distinct strain of this variety is recognized and locally propagated in York County, Pa., where the variety originated. It is of smaller size, is less oblique in form, is of brighter color, and has flesh of finer texture and longer keeping quality than the common type of the variety. The place or time of origin of this strain is yet undetermined.





BULLETIN No. 8.

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF POMOLOGY.

G. B. BRACKETT, POMOLOGIST.

REVISED

CATALOGUE OF FRUITS

RECOMMENDED FOR CULTIVATION IN THE VARIOUS
SECTIONS OF THE UNITED STATES AND
THE BRITISH PROVINCES

BY THE

AMERICAN POMOLOGICAL SOCIETY.

REVISED BY A COMMITTEE OF THE SOCIETY,

W. H. RAGAN, CHAIRMAN.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1899.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,
Washington, D. C., June 15, 1899.

SIR: In my letter of transmittal of August 18, 1897, accompanying the matter embraced in Bulletin No. 6 of this Division, the mutual arrangement that had been entered into between the Department of Agriculture and the American Pomological Society was fully set forth. The relationship thus established still exists, and the bulletin has been carefully revised and compiled for publication under the joint auspices of the Society and the Division. I now, therefore, have the honor to submit to you this revision, and trust that you may authorize its early publication.

As heretofore this revision has been made by a regularly appointed committee of the American Pomological Society, of which Prof. W. H. Ragan is chairman, and Mr. T. T. Lyon, Prof. E. J. Wickson, Prof. C. S. Crandall, Mr. Silas Wilson, and Mr. L. A. Berckmans are members.

Owing to the varied conditions of soil, climate, and elevation of the Pacific coast region it was thought advisable to make a special investigation of the pomological conditions in that section, and Prof. E. J. Wickson, of California, was accordingly appointed a special agent of this division for that purpose, and to him special credit is due for his valuable services rendered.

While it is manifestly impossible to construct a general fruit list that will constitute an infallible guide to the planter, it is hoped and believed that this revised catalogue of fruits will be of service to him in the selection of varieties adapted to his own locality.

With the above explanations I have the honor to recommend the publication of this catalogue as Bulletin No. 8 of this Division.

Very respectfully,

G. B. BRACKETT, *Pomologist.*

Hon. JAMES WILSON,
Secretary of Agriculture.

In accordance with agreement, publication as recommended is hereby authorized.

JAMES WILSON,
Secretary of Agriculture.

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INTRODUCTION.

The Revised Catalogue of Fruits prepared under the joint auspices of the American Pomological Society and the Division of Pomology of the United States Department of Agriculture is herewith submitted.

In making this revision the chairman of the committee on revision has availed himself of the experience of his able predecessor, Hon. T. T. Lyon, and, through correspondence, of many practical pomologists. Many sources of information have been sought and repeated efforts have been made to secure accurate and conservative opinions on the merits of varieties and their adaptability to the several districts. But notwithstanding these efforts the chairman of your committee is aware that this revision is not without defects.

The highest aim and desire of your committee has been to present reliable data concerning the behavior of varieties in various sections of our country. If this desire has not been realized it has been largely due to the difficulties experienced in outlining districts sufficiently homogeneous in soil, climate, and other important features, and in securing responses to the numerous inquiries sent out to practical fruit growers. While these difficulties have been quite real, it is yet due the fruit growers to say that they are as a class very generous in giving out information gathered through their experience.

Actuated by a desire to make the work as reliable as possible and therefore a safe guide to planters and others seeking such information, the work of this revision has been done at Washington, where easy access could be had to the library and records of the Division of Pomology as well as opportunity for frequent consultations with the Pomologist and his corps of assistants. All uncertainties of origin, nomenclature, etc., have been carefully investigated with a view to arriving at correct conclusions.

The general plan of the Catalogue is based on that of its immediate predecessor, which was largely the work of that eminent pomologist, the former chairman of your committee on revision, Hon. T. T. Lyon, of Michigan. The districts have been somewhat changed in boundaries and increased in number, in order, if possible, to conform more closely to practical as well as scientific principles. The map has also been enlarged and the boundaries of the districts made more distinct.

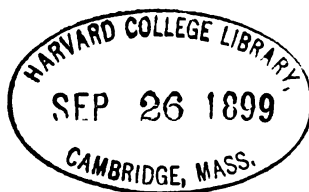
In view of the lack of knowledge on the part of any but a resident expert concerning the behavior of varieties and the true status of fruit

growing in that section of our country bordering on the Pacific coast. Prof. E. J. Wickson, of the University of California, was appointed by the Pomologist to prepare that portion of the Catalogue which is embraced in districts Nos. 15, 16, 17, 18, and 19, and this revision is based almost wholly on his report. The thanks of your committee are extended to Professor Wickson for his valuable services.

The list of public-spirited fruit growers generously contributing assistance is too large to attempt individual acknowledgment, but on behalf of the Society and its committee, I feel bound to refer especially to the invaluable aid of Colonel Brackett and his able assistant, Mr. William A. Taylor.

Respectfully submitted.

W. H. RAGAN, *Chairman.*



PLAN OF THE CATALOGUE.

This catalogue embraces species and varieties of fruits and nuts recommended for cultivation in the United States and the British American Provinces. These are arranged alphabetically in three divisions, as follows:

Division 1. Species and varieties mainly adapted to culture in the Northern and Middle States of the Union and in adjacent portions of the British Provinces.

Division 2. More southern, tropical, and subtropical species and varieties.

Division 3. Species indigenous and introduced, not included in the foregoing, which have not deviated under cultivation so far from their original types as to have deserved varietal names.

Varieties known to succeed in a given district are indicated by an asterisk (*); if highly successful, by two asterisks (**); if considered promising, by a dagger (†); if tested and found undesirable, by a dash (—); and if not reported on, by a dotted line (. . . .). These conclusions are not, however, to be accepted as absolutely correct and infallible, but rather as reflections of the opinions and experiences of practical fruit growers within the district. On account of the extended range of the districts and of the varying soil and climatic conditions the above caution must be kept in mind in considering the recommendations made in this catalogue. No planter should attempt to follow its markings absolutely, but should rely rather largely upon the experience of others and a correct knowledge of his own location and environment within the district.

Following the rules and recommendations of the American Pomological Society (which see, p. 162), prefixes, suffixes, secondary words and apostrophic or possessive terminations, together with words whose significations are expressed in the descriptive columns, are eliminated from the names of varieties when not required to insure their identity, and such words when used are italicized. Synonyms are also italicized and included within parentheses. Foreign names of varieties are only anglicized in the interest of brevity or for convenience of pronunciation.

The entire territory represented is divided into nineteen pomological districts, with little regard to State or provincial boundaries, but with primary reference to the influence of latitude, elevation, prevailing

winds, and oceanic and lacustrine exposures upon their adaptation to pomological pursuits (see map).

Size and quality, as usually expressed in pomological phraseology, are stated in the tabulations of varieties upon the scale of 1 to 10, as follows:

Scale of size and quality.

Size.	Scale.	Quality.
Very small.....	1	Very poor.
Small.....	2-3	Poor.
Small to medium.....	3-4	Poor to good.
Medium.....	5-6	Good to very good.
Medium to large.....	7-8	Very good.
Large.....	8-9	Very good to best.
Very large.....	10	Best.

District No. 1.—Maine above 500 feet elevation; New Hampshire, Vermont, and New York north of latitude 44°; Ontario north of Lake Simcoe and east of longitude 80°; Quebec, New Brunswick, and Prince Edwards Island. The dominant natural feature of this district is the St. Lawrence Valley. Many of the hardier fruits flourish within its borders.

District No. 2.—Nova Scotia; Maine below 500 feet elevation; New Hampshire and Vermont south of latitude 44°; Massachusetts; Rhode Island; Connecticut; New York south of latitude 44°, except Long Island; northern New Jersey above 500 feet elevation; Pennsylvania east of the Susquehanna River and above 500 feet elevation, north of latitude 41° west to the Allegheny River, and all of that portion of the State lying north of the Ohio River; Ohio and Indiana north of latitude 40°; and the lower peninsula of Michigan. The Annapolis Valley of Nova Scotia, the North Atlantic coast, the lake region of western New York, Ohio, and Michigan, and the Hudson River Valley are the leading features of District No. 2. This may be considered the northern grape, peach, and winter apple district.

District No. 3.—Long Island; New Jersey, except a small portion north; eastern Pennsylvania below 500 feet elevation; Delaware; and Maryland and Virginia below 500 feet elevation. This is the Delaware and Chesapeake Bay district. Though a small district, its productive capacity is great of the fruits that succeed within its borders.

District No. 4.—Pennsylvania above 500 feet elevation and south of latitude 41°; Maryland, Virginia, North Carolina, South Carolina, Georgia, Mississippi, and Alabama above 500 feet elevation; West Virginia; Tennessee and Kentucky; Ohio and Indiana south of latitude 40°; southern Illinois below the general elevation of 500 feet, from the Wabash to the Mississippi; Missouri south of a line from near St. Louis and along the elevation of 1,000 feet to the southeast corner of Kansas;

Oklahoma below 2,000 feet elevation; Indian Territory; and Arkansas north of latitude 35° , also south of it wherever the elevation exceeds 500 feet. The Allegheny and the Ozark mountains and the valleys of the Ohio, the Tennessee, and the Cumberland, and portions of the Wabash, the Mississippi, and the Arkansas rivers are embraced within this district. Portions of it are noted fruit regions, while throughout its vast territory the hardier deciduous fruits flourish. Many of the varieties recommended succeed best in certain localities within the district. An exception to the general character of the district occurs in those portions of Kentucky, Tennessee, Arkansas, and southeastern Missouri lying near the Mississippi River, where varieties adapted to culture in districts 5 and 7 generally succeed.

District No. 5.—Eastern North Carolina, South Carolina, and Georgia below 500 feet elevation; and Florida north of latitude 30° east of the Chattahoochee River and above 100 feet elevation. This district embraces the southern Atlantic seaboard, with its many frith-like indentations and valleys. The climate is generally mild, and within its borders many of the more tender deciduous fruits flourish.

District No. 6.—Florida south of latitude 30° , and the remaining portions of the State with elevations below 100 feet, and those portions of Alabama, Mississippi, Louisiana, Arkansas, and Texas lying below the 100-foot contour line as it skirts the coast from Florida to the Rio Grande. This is the Southern Peninsula and the Gulf Coast district. The successful culture of citrous and other subtropical fruits and nuts is restricted to the peninsula portion of Florida and to the delta of the Mississippi. Tropical species are only recommended for that portion of Florida lying south of latitude 27° , and are indicated by the letter s in connection with the starring.

District No. 7.—Florida west of the Chattahoochee River and above 100 feet elevation, Alabama, Mississippi, Louisiana, and Arkansas above 100 and below 500 feet elevation; and Texas south of Red River and above 100 and below 1,000 feet elevation. This may be denominated the Valley district. It embraces portions of the Chattahoochee, Alabama, Pearl, Mississippi, Arkansas, Red, Sabine, Colorado, and Rio Grande valleys. The climate in the eastern and larger portion is warm and moist, in the extreme west more dry and tending toward aridity. A wide range of the more tender varieties and species is adapted to culture in the district.

District No. 8.—Illinois north of the 500-foot contour line as it crosses the State between 38° and 39° latitude; a small portion of southwest Wisconsin; Iowa south of about latitude $42^{\circ} 30'$; the Missouri River Valley portion of southeastern South Dakota; Nebraska and Kansas below 2,000 feet elevation; and Missouri north of a line drawn from near St. Louis and along the elevation of 1,000 feet to the southeast corner of Kansas. The Missouri and Mississippi valley sections of the district are its dominant features. The hardy deciduous fruits

succeed in most portions, and commercial fruit growing is a rapidly developing industry.

District No. 9.—Wisconsin except the southwest corner; Minnesota; upper Michigan; Iowa north of about latitude $42^{\circ} 30'$; North and South Dakota east of longitude 99° ; and the British Provinces west of longitude 80° and east of longitude 99° . This district embraces the upper lakes including Winnipeg, the Upper Mississippi and the Red River valleys. Only the hardier fruits succeed, but fair progress has been made in recent years in developing varieties adapted to this region.

District No. 10.—Nebraska, Kansas, and Oklahoma above 2,000 feet elevation; Texas above 2,000 feet elevation and north of Red River and latitude 35° ; also Colorado below 5,000 feet. This is the Central Plain and Foot Hill district. It lies on the eastern slope of the Continental Divide. There are small sections, especially in eastern Colorado, where the apple and other hardy fruits are very successfully grown.

District No. 11.—Texas above 1,000 feet and south of Red River and latitude 35° and east of longitude 103° and the Pecos and Rio Grande rivers. This may be accepted as an extension southward of District No. 10, with very similar conditions but a warmer and more southern climate.

District No. 12.—Texas west of longitude 103° and the Pecos River, and New Mexico south of latitude 35° . The Pecos and Rio Grande valleys are the characteristic features of this district. Considerable effort at growing fruit, especially the apple and the hardier *vinifera* grapes, is being made in many localities.

District No. 13.—New Mexico and Arizona north of latitude 35° ; Utah; and Colorado above 5,000 feet elevation. This district embraces the Continental Divide and the Great Salt Lake, and it also embraces the valley and canyon of the Colorado and the sources of the important streams south of the Missouri and Yellowstone. It affords a great diversity of soils and climatic conditions, and hence a wide range of fruit growing. The species successfully grown within the boundaries of this district range from the *vinifera* grapes to the hardy iron clad apples.

District No. 14.—The Dakotas west of longitude 99° ; Wyoming; Montana east of longitude 111° ; and the British Provinces lying between longitude 99° and 111° . The upper Missouri and Yellowstone valleys are the distinctive features of the district. There is perhaps no section of the district in which fruit growing has reached a very high state of development. Leading causes of this condition may be found in the comparatively undeveloped, or unsettled, state of the country and its great elevation.

District No. 15.—British America west of longitude 111° and east of longitude 122° ; Montana west of longitude 111° ; Idaho; Nevada; and Washington, Oregon, and California east of the general coast con-

tour line of 1,000 feet elevation, commencing at the British boundary near longitude 122° and southward on said elevation to its intersection of the Southern Pacific Railway in the Upper Willamette Valley, thence along the line of said railway to the Sacramento Valley, thence east and south on the eastern rim of said valley and that of the San Joaquin at an elevation of 1,000 feet to latitude 35° , thence east on said latitude to the Colorado River. The characteristic features of this district are the Upper Columbia Valley and the Sierra Nevada Mountains. An exception to the general recommendation will appear in certain portions of Snake River Valley, where the *vinifera* grapes and other tender fruits succeed.

District No. 16.—The coast section of British America west of longitude 122° and of Washington, Oregon, and California north of about latitude $39^{\circ} 30'$, and bounded on the east by Districts Nos. 15 and 17. This district embraces the highly developed fruit-growing sections on Puget Sound, the Lower Columbia, and the Willamette.

District No. 17.—The Sacramento and San Joaquin valleys, bounded on the east by District No. 15 and on the west by the western rim of this great interior basin. The diversified fruit and nut products of this district are marvelous. There are localities in which the semi-tropical species and others in which the apple, pear, and other hardy fruits and nuts are grown to the highest perfection.

District No. 18.—The coast section of California lying between latitude 35° and about $39^{\circ} 30'$ and bounded on the east by District No. 17. Its characteristic features are the Coast Range of mountains, the Russian River, the Sonoma, the Santa Clara, and the Pajaro valleys.

District No. 19.—California and Arizona south of latitude 35° . The dominant characteristics are the valleys of the Gila, the Colorado, the San Gabriel, and the Santa Ana and the Sierra Madre mountains. It includes the celebrated fruit districts of Santa Ana, Riverside, Santa Barbara, the Salt River Valley, San Diego, and many others.

Districts 16, 17, 18, and 19 are peculiarly adapted to fruit and nut culture. Perhaps no portion of the earth's surface is more highly favored in climate and soil and affords a wider range of crop products than that lying within the boundaries of these four districts. The commercial value of the fruit and nut products of this section are already felt and recognized the world over.

REVISED CATALOGUE OF FRUITS.

Division I.—FRUITS MAINLY ADAPTED TO NORTHERN LOCALITIES.

This division includes such cultivated species, commonly designated "hardy" fruits and nuts, as have developed distinct varieties which are propagated on a commercial scale by some of the various methods of bud propagation.

Section 1.—APPLES. (*Pyrus*.)

SUBSECTION 1.—CRABS. (*P. PRUNIFOLIA*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; i, irregular; o, oblate; ob, oblong; ov, ovate; r, round. Color: d, dark; g, green; r, red; ru, russet; s, striped; w, white; y, yellow. Flavor: a, acid; m, mild; s, sweet. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: c, cider; d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Eng., England; Eur., Europe; Fr., France; Ger., Germany; Holl., Holland; Ont., Ontario; Rus., Russia; Scot., Scotland.]

Name.	Description.						Districts and starring.																				
	Size.	Form.	Color.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Ball Winter	5	r	wy	s	5-6	vl	k	Vt.	*																		
Beach	7	r	r	s	5	em	km	Am.	*																		
Brier	7	r	r	s	5	em	km	WVa.	*								*										
Elgin	7	rob	yr	a	0	l	km	Ill.	*								*										
Excelsior	8	ro	ys	a	6	e	k	Minn.	*								*										
Gibb	0	o	yr	a	9	e	k	WVa.	**								*										
Hyalop.	6	r	r	a	3	em	km	Am.	*							*	**										
Inland Gem	0	r	r	a	7-8	m	dk	Vt.	*							*	**										
Jumbo	10	ob	ry	a	10	l	dkm	Vt.	*								*										
Marengo	6	ro	yr	a	3-4	l	km	Ill.	*								*										
Martha	5	o	yr	a	5-6	e	km	Minn.	**							*	*										
Minnesota	10	ob	yr	a	5	l	km	Minn.	*							*	*										
Montreal	8	rob	yr	a	3-4	ml	ckm	Am.	*							*	*										
Orange	5	r	ys	s	3-4	l	k	Am.	*							*	*										
Purple Sweet	5	ro	ys	s	8	m	dkm	Can.	*							*	*										
Queen Choice	5	r	r	m	7-8	l	k	(f)	*							*	*										
Red Siberian	4	rob	r	m	3-4	e	k	Fr.	*							*	*										
Stansstead, Rose of	5	ob	r	r	10	l	k	Can.	**							*	*										

Section 1.—APPLES. (Fruit.)—Continued.

SUBSECTION 2.—APPLES. (P. MALUS.)—Continued.

Name.	Description.						Districts and starting.																				
	Size.	Form.	Color.	1 Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Carolina Beauty.....	5-6	rob	dr	m	7	1	km	N. C.																			
Carter Blue.....	6-7	rob	gr	m	5-6	m	dm	Ala.																			
Champlain (Nyack).....	6-7	rob	yr	a	5-6	em	dm	N. Y.																			
Charmoff.....	5-6	rob	grs	a	6	e	dm	Rua.																			
Chenango.....	0-7	obc	yr	a	8	e	dm	N. Y.																			
Christmas.....	4-5	f	yr	a	6	m	dk	Rua.																			
Clark Pearmain.....	4-5	f	yr	a	6	m	dk	Rua.																			
Clayton.....	5-6	rob	grs	m	5-6	m	dm	N. C.																			
Clyde Beauty.....	6-8	rob	gr	m	6-7	vl	km	Ind.																			
Cogswell.....	7-8	rob	gr	m	4	l	dm	N. Y.																			
Colina (Champion).....	6	o	s	m	7	l	dm	Conn.																			
Colton Early.....	5-6	f	y	s	7	l	dm	Ark.																			
Cooper.....	8	rob	yr	m	4	e	dm	Am. f																			
Cooper Market.....	5-6	obc	yr	m	4	l	dm	N. J.																			
Cornell Fancy.....	5	obc	yr	m	0-7	em	dm	Pa.																			
Cracking.....	7-9	rob	yr	m	4	m	km	Ohio																			
Crawford.....	5	obc	yr	m	6	m	km	Rua.																			
Cullasaga.....	6-7	rob	yr	m	4	l	km	N. C.																			
Danvers Sweet.....	5-6	rob	yr	s	5-6	l	dm	N. Y.																			
Derry.....	6-7	l	y	s	7-8	l	dm	Vt.																			
Domine.....	6-7	o	gr	m	5	l	dm	N. Y.																			
Donnegan.....	5-6	f	wig	m	7-8	me	dkm	Tex.																			
Doyle.....	8	rob	yr	m	4-5	me	dk	Holl.																			
Dutch Mignonne.....	5-6	rob	yr	m	9-10	l	dm	Fr. f																			
Dyer (Pomme Royal).....	5-6	f	yr	m	5	e	dm	Am.																			
Early Cooper.....	5-6	rob	yr	m	3	e	dm	Am.																			
Early Harvest.....	5-6	rob	yw	mta	8-9	e	dk	N. Y.																			
Early Joe.....	7-8	obc	yr	m	4-5	e	dm	N. Y.																			
Early Pennock.....	7-8	rob	yr	m	2-4	e	dm	Am.																			
Early Ripe.....	5-6	rob	y	m	2-4	e	dm	Pa.																			
Early Strawberry.....	3-4	rob	y	m	6-7	e	dm	N. Y.																			
English Russet.....	3-6	rob	yr	m	5-6	vl	dm	()																			
Esopus Spitzenburg.....	0-8	obc	r	m	10	l	dm	N. Y.																			
Evening Party.....	4-5	o	yr	m	5-6	l	dm	Pa.																			
Swalt.....	8	rob	yr	m	4-5	l	dm	Pa.																			
Fallwater (Tulpehocken).....	9-10	rob	yr	m	4-5	l	dm	Pa.																			
Fall Harvey.....	7-8	rob	yr	m	4-5	l	dm	Mass.																			
Fall Jonneting.....	7-8	obc	yr	m	3-4	m	dm	Conn.																			

[illegible]

Section 1.—APPLES. (Pyrus.)—Continued.
 SUBSECTION 2.—APPLES. (P. MALUS).—Continued.

Name.	Description.					Origin.	Districts and starring.																				
	Size.	Form.	Color.	Flavor.	Quality.		Season.	Use.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
July, Fourth of	4-5	roc	wyr	m	3-4	vs	cu																				
Junalakee.....	5-6	ro	y	m	4-6	l	d																				
Kamp.....	6-7	r	y	m		l	km																				
Kent Beauty.....	8-9	ro	gr	m	3-4	l	k																				
Kernode.....	7-8	rob	vs	m	7-8	vl	dm																				
Keawick.....	6-7	cl	gr	a	5-6	em	k																				
Kinard.....	5-6	oci	yr	m	5-6	l	dk																				
Kirkbridge.....	4-5	obi	yro	m	3-4	c	km																				
Krauser.....	5-6		rs	m	6	vl	dk																				
Lady.....	1-2	o	yr	m	6-7	l	dm																				
Lady Sweet.....	7-8	rob	gr	s	6-8	l	dk																				
Lankford.....	7-8	ro	gr	m	7-8	l	dm																				
Lansburg.....	5-6	ro	yr	m	3-4	vl	m																				
Late Strawberry.....	5-6	ro	wrs	m	5-6	m	d																				
Lavay.....	7-8	ro	r	m	5-6	vl	dm																				
Lehigh Greening.....	6-7		y	m	6-7	vl	dkm																				
Lilly of Kent.....	7-8	roc	g	m	7-9	c	dm																				
Limbwing.....	6-7	roc	gr	m	3-6	vl	k																				
Longfield.....	5-6	ro	y	m	4-5	l	d																				
Louise, Princess.....	5-6	ro	we	m	5-6	l	dm																				
Lowell.....	8-9	ou	y	m	6-7	c	km																				
Lowland Raspberry.....	8-9	ob	y	m	6-7	c	km																				
McAtee.....	7-8	r	ys	m	4-5	c	km																				
McCutler.....	7-8	ro	gr	m	5-7	l	m																				
McIntosh.....	6-7	ro	nr	m	6-7	l	dm																				
McLellan.....	5-7	roc	yr	m	5-6	m	dm																				
McMahon.....	8-9	ro	yr	m	4-5	m	dm																				
Magog Red Streak.....	7-8	rob	yr	m	7-8	l	dkm																				
Malden Blush.....	5-6	o	yr	m	5-6	c	km																				
Malinda.....	6-7	re	yr	m	5-6	vl	dkm																				
Mangum (Gulley).....	5-6	oc	yr	m	6-8	m	d																				
Mann.....	6-7	ro	yg	m	4-5	vl	mk																				
Margaret, Early Red.....	5-6	o	yr	m	5-6	c	d																				
Mason Stranger.....	5-6	ro	yr	m	5-6	l	d																				
Maryland Maiden Blush.....	4-6	ro	yr	m	7-8	ml	mk																				
Matamoras.....	5-6	roc	yr	m	3-4	l	k																				
Mattamuskeet.....	7-8	ro	yr	s	4-9	l	mk																				

[illegible]

Section 1.—APPLES. (Pyrus.)—Continued.
 SUBSECTION 2.—APPLES. (P. MALUS.)—Continued.

Name.	Description.						Districts and starring.																				
	Size.	Form.	Color.	Flavor.	Quality.	Season.	Tree.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Red June, Carolina.....	3-4	ovo	rs	m	6-7	ve	dm	N.C.	*	*	*	*	*	*	**		**	*	*	*				*	*	*	*
Red Stripe.....	5-6	obc	wrs	m	5-6	e	k	Ind.	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Rebka Malenka.....	3-4	rc	rs	m	5	lm	dm	Rus.	*	*	*	*	*	*	**		*	*	*	*			*	*	*	*	*
Rhode Island Greening.....	8-9	ro	gy	w	7-8	l	dk	R.I.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Ribston.....	5-6	r	gy	w	7-8	l	dk	Eng.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Ridge Pippin.....	7-8	rcd	yr	m	5-6	l	dk	Pa.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Ridgite (Macomber).....	7-8	rcd	yr	m	8	m	dkm	Me.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Roma (Macomber).....	3-4	ro	yr	m	6-7	l	d	Am.	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Romanite, South.....	5-6	r	wyt	m	8-9	l	dkm	N.J.	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Roman Stem.....	8-9	ro	yr	m	6-7	ml	dkm	Ohio	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Roma Beauty.....	5-6	rcd	yr	m	6-7	ml	dkm	Mass.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Rosbury.....	5-6	rov	yr	m	7-9	o	d	Am.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Russell.....	5-6	ov	grs	m	7-8	l	dkm	Rus.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Russell Baldwin.....	5-6	rob	yr	m	7-8	l	dkm	Ill.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Salem.....	5-6	r	yr	m	7-8	l	dkm	Vt.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Saint Johnsbury.....	5-6	rc	rs	m	6-7	m	dm	Am.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Saint Lawrence.....	5-6	oc	rs	m	5-7	m	dm	Vt.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Saint Winter.....	5	o	rs	m	5-7	m	dkm	Mich.	*	*	*	*	*	*	**		*	*	*	*			*	*	*	*	*
Shades.....	5-6	o	wrs	m	7-8	l	dm	Pa.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Shedden.....	3-4	rc	yr	m	5-6	l	dm	Pa.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Smith Cedar.....	6-7	roc	yr	m	5-6	l	dm	Pa.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Smoketongue.....	6-7	ro	yr	m	5-6	l	k	Pa.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Sops of Wine.....	8-9	r	yr	m	5-6	o	d	Eur.	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Stark.....	5-6	rob	ys	m	5-6	l	m	Ohio	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Starkey.....	7-8	ocr	ys	m	8	ml	dkm	Me.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Stayman Winesap.....	8-9	ro	r	m	8-9	l	mdk	Kans.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Stephenson.....	5-6	rob	yr	m	5-6	l	dm	Mass.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Sterling (American Beauty).....	8-9	ro	yr	m	7-8	l	d	N.C.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Summer King.....	7-8	ro	yr	m	6-7	e	dk	N.C.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Summer Pearmain.....	5-6	ro	ru	m	9-10	em	dm	Am.	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Summer Queen.....	6-7	ro	yr	m	5-6	e	k	Am.	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Summer Rose.....	4-5	r	yr	m	6-7	ve	dm	N.J.	*	*	*	*	*	*	**		**	*	*	*			*	*	*	*	*
Sutton.....	6-7	roc	yr	m	7-8	l	dm	Mass.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Swaar.....	7-8	ro	gy	m	7-8	l	d	N.Y.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Sway Pomme Gris.....	2-4	ro	or	m	8-9	l	dm	Can.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Sweet Winesap.....	5-6	oc	r	s	8-9	l	dk	Pa.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Switzer.....	5-6	r	wt	m	6-7	l	k	Rus.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*
Taunton.....	7-8	oc	ys	a	5-6	m	k	Ala.	*	*	*	*	*	*	—		*	*	*	*			*	*	*	*	*

[illegible]

Section 2.—APRICOTS. (*Armeniaca vulgaris*.)

[KEY.—Size, scale 1 to 10; 1, very small; 10, very large. Form: c, compressed; co, conical; o, oblate; ob, oblong; r, round. Color: o, orange; r, red; y, yellow. Pit and kernel: b, bitter; c, oling; f, free; i, impervious; p, pervious; s, sweet. Quality, scale 1 to 10; 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, desert; k, kitchen; m, market. Abbreviations of names of places of origin: Afr., Africa; Eng., England; Eur., Europe; Fr., France.]

Name.	Description.						Districts and starring.																				
	Size.	Form.	Color.	Pit and kernel.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Alexander	4-5	ob	oy	.....	4-5	m	dm	Rus.																			
Blenheim	6-7	o	oy	.....	6-7	m	dm	Afr.																			
Breda	3-4	ro	o	s	7-8	m	dm	N. Y.	*		*																
Early Golden	2-3	r	o	f	7-8	e	d	N. Y.	*																		
Eureka	6-7				5-6	ve		Cal.							*												
Harris	5-6	obc	or	.....	6-7	ve	dm	N. Y.	f																		
Hemakirke	8-9	ro	or	ib	6-9	ve	d	Eng.																			
Large Early	5-6	obc	or	bf	7-8	e	d	Fr.																			
Moorpark	8-9	r	or	pb	7-8	m	d	Eng.			**					*								*	*	*	*
Newcastle	5-6	r	oy	f	6-7	m	d	Cal.				*												*	*	*	*
Orange	5-6	or	or	ca	3-4	e	k	Eur. f																	*	*	*
Peach	10	rooc	yo	pb	7-8	m	d	Italy										*	*	*	*	*	*	*	*	*	*
Routier Peach	6-7	ro	yr	i	7-8	ve	d	Cal.								*							*	*	*	*	*
Royal	7-8	ro	yr	i	7-8	ve	d	Fr.								*							*	*	*	*	*
St. Ambroise	8-9	rc	yr	.....	7-8	l	d	Fr. f																*	*	*	*

Section 3.—BLACKBERRIES AND DEWBERRIES. (Eubae.)

SUBSECTION 1.—BLACKBERRIES. (*R. VILLOSA*.)

[KEY.—Size, scale 1 to 10; 1, very small; 10, very large. Form: c, conical; o, oblong; ov, oval; r, round. Color: b, black. Quality, scale 1 to 10; 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of origin: Am., America.]

Name.	Description.					Districts and starting.																				
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Agawam.....	7-8	ro	b	8-9	e	dm	Am.																			
Allen.....	7-8	oc	b	9-10	ve	dm	Pa.		†							*										
Briton, Ancient.....	5-6	ovv	b	5	m	m	Wis	*								**	**									
Brunton.....	5-6	o	b	9-10	e	dm	Am.					*														
Crundall.....					ve		Tex. f.																			
Dallas.....	7-8		b	7-8	m	dkm	Tex.						*													
Early Harvest.....	4-5	ro	b	7-8	e	dm	Ill.			*																
Eldorado.....	7-9	o	b	7-9	e	dkm	Ohio			*					†											
Erie.....	8-9	rov	b	5	m	m	Pa.																			
Kittatunny.....	7-9	ro	b	7-8	ml	d	N. J.				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lawton.....	8-9	ov	b	7-8	m	dm	N. Y.				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Minnewaska.....	9	ov	b	6	m	dm	N. Y.				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Robison.....	7-8	ro	b	7-8	cm	km	Tex.																			
Snyder.....	6-7	o	b	7-8	ml	dm	Ind.		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Stone.....	5	ro	b	7-8	l	d	Wis.		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Taylor.....	6-7	ro	b	7-8	l	d	Ind.		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Triumph, Western.....	5-6	ovv	b	6	l	d	Am.		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wachusett.....	5	ovv	b	7	e	d	Mass.		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wilson.....	8-9	ovv	b	7-8	m	m	N. J.		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—DEWBERRIES. (*R. CANADENSIS*.)

	9-10	ovv	b	6	e	dk	W. Va.	*	aa	aa	aa	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*</
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Section 4.—CHERRIES. (*Cerasus*.)SUBSECTION 1.—HEARTS AND BIGARREAU'S. (*C. AVIUM*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, compressed; h, heart shaped; o, oblate; r, round. Color: a, amber; b, black; p, purple; r, red; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. All abbreviations of names of places of origin: Am., America; Eng., England; Eur., Europe; Fr., France; Ger., Germany; Ont., Ontario; Rus., Russia.]

Name.	Description.					Districts and starring.																					
	Size.	Form.	Color.	Quality.	Season.	Time.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Bing	7-8			8-9	l	dm	Oreg.																				
Black Heart	6-7	hc	b	5-6	ve	dm	Eur.?																				
Centennial	9-10	oh	yr	8-9		dm	Cal.																				
Coe Transparent	5-6	r	yr	10	e	dm	Conn.																				
Downer	5-6	rh	yr	8-9	m	dm	Mass.																				
Engle, Black	6-7	oh	b	6-7	m	dm	Eng.																				
Early Purple Guigne	3-4	rh	pb	6-7	ve	d	(?)																				
Elkhorn	8-9	h	b	7-8	l	dm	Eng.																				
Elton	8-9	h	yr	9	e	dm	Eng.																				
Haskins	9-10	rh	pr	7-8	lm	dm	Oreg.																				
Knight Early	8-9	oh	b	7-8	e	d	Eng.																				
Lambert	9-10	h	pr	8-9	ml	dm	Oreg.																				
Levell	8-9	rh	b	8-9	m	dm	Oreg.																				
Mezel	9-10	oh	rb	7-8	m	d	Eur.																				
Napoleon (<i>Royal Ann</i>)	8-9	h	yr	5-6	m	dm	Eur.																				
Oxheart	7-8	oh	r	5-6	vl	dm	Eur.																				
Republican, Black	8-9	b			vl	dm	Oreg.																				
Rockport	8-9	oh	ra	8-9	m	dm	Ohio																				
Spanish, Yellow	9-10	oh	yr	9-10	em	d	Eur.																				
Tartarian, Black	9-10	h	b	9-10	em	dm	Rus.																				
Windsor	8	h	yr	7-8	l	dm	Ont.																				
Wood, Governor	7-8	rh	yr	7-8	em	em	Ohio																				

SUBSECTION 2.—DUKE AND MORELLO CHERRIES. (*C. VULGARIS*.)

Amarelle Hative	6-7	r	.....	7-8	e	m	Eur.																			
Archduke	8-9	oh	r	7-8	em	dm	Eur.																			
Bessersbrian	5-6	r	r	5	l	k	Rus.																			
Bruse et Braune	9	r	r	8-9	l	k	Eur.																			
Carnation	8-9	r	ra	4-5	em	dm	Eur.																			
Chobley, Belle de	6-7	r	ra	10	o	d	Fr.																			
Duchonae	5-6	ro	r	5-6	ve	k	Ky																			

Section 5.—CURRANTS. (Ribes.)

SUBSECTION 1.—*R. NIGRUM* AND *AUREUM*.

[**KEY.**—Size, scale 1 to 10: 1, very small; 10, very large. Form: r, round. Color: b, black; r, red; w, white. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Eng., England; Eur., Europe; Fr., France; Ont., Ontario.]

Name.	Description.					Origin.	Districts and starring.																			
	Size.	Form.	Color.	Quality.	Season.		Use.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Champion	8-9	r	b	5-6	em	km	Eng	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Crandal	9	ro	b	6-7	l	k	Kau	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
English	5-6	r	b	4-5	m	km	Eng	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Lee Profitie	8-9	r	b	6-7	m	km	Am. f	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Naples	6-7	r	b	1-7	m	km	Eur.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Saunders	7-8	r	b	6-7	m	km	Ont.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wales, Prince of	7-8	r	b	6-7	m	km	Ont.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—*R. RUBRUM*.

Albert, Prince	7-8	r	r	7-8	e	dm	Eur.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Cherry	9-10	r	r	5-6	m	m	Eur.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Fay	9-10	r	r	5-6	m	m	N. Y.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Holland, Long Bunch	5-6	r	r	4-5	em	km	Eur.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
London Market	5-6	r	r	4-5	m	km	Eur.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Moore Ruby	9-10	r	r	6-7	l	km	Eng	*	*					*	*	*	*	*	*	*	*	*	*	*	*
North Star	5-6	r	r	5-6	l	km	N. Y.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Red Dutch	9-10	r	r	9-10	dm	dm	Minn	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Red Cross	6-7	r	r	8-9	m	km	Eur. l	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Red Grape	5-6	r	r	7-8	m	km	Eur. l	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Ruby Castle	6-7	r	r	6-8	m	km	Eur. l	*	*					*	*	*	*	*	*	*	*	*	*	*	*
St. Giles, Belle de	9-10	r	r	7-8	m	km	Eur. l	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Versaille	9-10	r	r	5-6	m	km	Eur. l	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Victoria	6-7	r	r	5-6	m	m	Fr.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
White Dutch	6-7	r	w	9-10	m	d	Eng	*	*					*	*	*	*	*	*	*	*	*	*	*	*
White Contoum	6-7	r	w	9-10	m	d	Eur.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
White Grape	7-8	r	w	8-9	m	m	Eur.	*	*					*	*	*	*	*	*	*	*	*	*	*	*
Wilder	8-9	r	r	7-8	m	m	N. Y.	*	*					*	*	*	*	*	*	*	*	*	*	*	*

Section 6.—GOOSEBERRIES. (*Ribes*)SUBSECTION 1.—*R. GROSSULARIA*.¹

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, oval; r, round. Color: g, green; r, red; w, white; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium. Use: d, dessert; k, kitchen; n, market. Abbreviations of names of places of origin: Am., America; Eng., England; Ont., Ontario.]

Name.	Description.					Districts and starting.																				
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Chautauque	8-9	ro	gw	5-10	n	km	N. Y.								*											
Columbus	8-9	ro	gy	9-10	m	km	Am.								*											
Crown Bob	8-9	o	r	7-8	e	km	Eng								*											
Industry	9-10	ro	r	6-7	e	km	Eng								*											
Triumph	8-9	ro	gw	7-8	e	dm	Pa.								*											
Wellington	8-9	o	kw	5-6	e	mk	Eng								*											
Whitesmith	8-9	o	g	5-6	e	km	Eng								—	*										

SUBSECTION 2.—*R. OXYACANTHOIDES*.²

Champion.....	5-6	ro	gy	5	e	km	Am.								*											
Downing.....	5-6	r	g	5-6	m	km	N. Y.								*											
Houghton.....	2-3	ro	r	7-8	m	dk	Mass.							*	*	*	*	*	*	*	*	*	*	*	*	*
Pale Red.....	2-3	ro	r	9-10	m	dk	Am.							*	*	*	*	*	*	*	*	*	*	*	*	*
Pearl.....	5-6	r	g	9-10	m	dk	Ont.							*	*	*	*	*	*	*	*	*	*	*	*	*
Red Jacket.....	5-6	ro	r	8	e	km	Ont.							*	*	*	*	*	*	*	*	*	*	*	*	*
Smith.....	5-6	o	yg	9	e	kd	Vt.							*	*	*	*	*	*	*	*	*	*	*	*	*

¹ Includes American seedlings of this parentage.² Includes apparent hybrids of this with other species.

Section 7.—GRAPES. (Vitis.)

SUBSECTION 1.—V. ESTIVALIS.

[Key.—Size, scale 1 to 10; 1, very small; 10, very large. Form: o, oval; r, round. Color: a, amber; b, black; g, green; r, red; w, white; y, yellow. Quality, scale 1 to 10; 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; m, market; w, wine. Abbreviations of names of places of origin: Am., America; Ont., Ontario.]

Name.	Description.						Districts and starting.																				
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
NORTHERN GROUP.																											
Cynthiana.....	2-3	r	b	7-8	e	w	Ark.	*							*				*								
Eumelan.....	5-6	r	b	7-8	m	d	N.Y.	*																			
Gold Coin.....	6-7	r	w	8-9	me	dm	Tex.	*								—		*									
Muench.....	7-8	r	b	9	me	dm	Tex.				*				*												
Norton.....	2-3	r	b	5-6	e	w	Va.	*							*				*								
Norton Virginia.....	2-3	r	b	5-6	e	w	Va.																				
Superb.....	7-8	r	b	9	ml	dm	Ga.																				
SOUTHERN GROUP (Syn. V. Bourquiniana).																											
Delaware.....	2-3	r	r	10	m	dm	N.J.	*							*	*	*	*	*	*	*	*	*	*	*	*	*
Elvland.....	2-3	r	r	8-9	m	d	Tex.								*			*	*	*	*	*	*	*	*	*	*
Herbmont.....	2-3	r	b	7-8	l	dw	South				*				*			*	*	*	*	*	*	*	*	*	*
Lenoir.....	2-3	r	rb	5-6	l	dm	N.C.							*				*	*	*	*	*	*	*	*	*	*
Water.....	5-6	r	r	7-8	ml	d	N.Y.							*				*	*	*	*	*	*	*	*	*	*
Wyle.....	2-3	r	r	8-9	ve	d	S.C.							*				*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—V. LABRUSCA.

Agawam.....	8-9	ro	rb	6-7	m	dm	Mass.	*							*				*							
Barry.....	8-9	r	b	6-7	m	dm	Mass.	*							*				*							
Brighton.....	7-8	r	r	7-8	e	d	N.Y.	*							*				*							
Brilliant.....	5-6	r	r	7-8	e	dm	Tex.	*							*				*							
Catawba.....	6-7	r	r	8-9	vl	dm	N.C.	*							*				*							
Champion.....	5-6	r	b	2-3	ve	m	Am.	*							*				*							
Concord.....	7-8	r	b	5-6	m	m	Mass.	*							*				*							
Cottage.....	7-8	r	b	5-6	m	m	Mass.	*							*				*							
Diamond.....	6-7	r	gw	7-8	m	dm	N.Y.	*							*				*							
Diana.....	5-6	ro	ro	7-8	m	d	Mass.	*							*				*							
Dracut.....	7-8	ro	a	7-8	m	dm	N.Y.	*							*				*							
Dracut Amber.....	7-8	ro	a	7-8	m	dm	N.Y.	*							*				*							
Duchess.....	4-5	ro	gw	8-9	ml	d	Mass.	*							*				*							
Elvira.....	3-4	r	gw	7-8	m	d	Mo.	*							*				*							

Empire State.	3-4	r	w	7-8	m	d	N. Y.
Goethe.	9-10	o	gr	7-8	l	d	Mass
Hartford.	6-7	r	b	4-5	e	m	Conn
Hayes.	5-6	r	vw	6-7	e	d	Mass
Herbert.	7-8	r	b	7-8	e	dm	Mass
Iona.	5-6	ro	r	9-10	e	d	N. Y.
Isabella.	7-8	ro	b	7-8	m	dm	S. C.
Ives.	5-6	ro	b	5-6	e	m	Ohio.
Janesville.	5-6	r	b	3-4	e	m	Wis.
Jefferson.	5-6	r	b	7-8	ml	d	N. Y.
Lady.	7-8	ro	w	6-7	dm	d	Ohio.
Lindley.	5-6	r	w	5-6	m	dm	Mass
Loretto, Queen.	5-6	r	w	7-8	m	d	Tenn
Little.	5-6	r	r	5-6	l	dm	Mass
Massasoit.	7-8	r	r	5-6	m	dm	Mass
Merrimac.	8-9	r	b	7	m	dm	Mass
Moore Early.	8-9	r	b	6-7	e	m	Mass
Moyer.	3-4	r	r	8-9	m	dm	Conn
Murray.	8	r	m	8	ml	dm	
Nectar.	4-5	r	b	8-9	e	m	N. Y.
Niagara.	8-9	r	w	7-8	ml	m	N. Y.
Niagara.	5-6	r	w	6-7	m	d	Tex
Olita.	5-6	r	w	2-3	ve	d	Mass
Perkins.	7-8	r	b	7-8	m	d	Cal
Pierce.	8-9	r	b	6-7	em	m	N. Y.
Pocklington.	8-9	r	wy	7-8	m	d	N. Y.
Prentiss.	5-6	r	w	7-8	m	dm	Mass
Salem.	9-10	r	y	7-8	vl	d	Ohio
Triumph.	7-8	r	a	9-10	m	dm	N. Y.
Uister.	6-6	r	o	8-9	m	dm	Vt.
Vergennes.	7-8	r	o	8-9	ve	dm	Kans
Victor.	5-6	r	ve	7-8	l	d	N. Y.
Washington, Lady.	6-7	r	vn	7-8	m	d	N. Y.
Wilder.	9-10	r	b	7-8	e	m	Mass
Winchell (Green Mountain).	4-5	r	w	7-8	e	m	Vt.
Woodbury.	8-9	ro	w	7-8	em	m	Meib
Woodruff.	8-9	r	b	6-7	em	m	N. Y.
Worden.	7-8	r	b	7-8	em	m	N. Y.

SUBSECTION 3.—V. LINCEUM II.

Americas.	3-4	r	b	5-6	m	w	Tex.
Bailey.	6-7	r	b	8-9	e	dm	Tex.
Beacon.	7-8	r	b	7-8	e	dm	Tex.
Carrington.	7-8	r	b	7-8	vl	dm	Tex.
Fern Mountain.	3-5	r	b	4-5	vl	w	Tex.
Lansel.	4-5	r	b	7-8	vl	dm	Tex.
Jaeger, Herman.	5-6	r	b	7-8	vl	dm	Tex.

Includes apparent hybrids.

Section 7.—GRAPES. (*Vitis*).—Continued.SUBSECTION 4.—*V. ROTUNDIFOLIA*.

Name.	Description.					Districts and starring.																				
	Size.	Form.	Color.	Quality.	Season.	Loc.	Origin.																			
								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Eden.....	7-8	r	b	g	l	dw	Ga.				*	**														
Flowers.....	8-9	r	b	4-5	vl	dw	South.				**	**	**	**												
James.....	9-10	r	b	6-8	vl	d	N. C.				*	**	**	**												
Memory.....							South				*	**	**	**												
Mish.....	6-7	o	b	5-6	vo		N. C.				*	**	**	**												
Scuppernon.....	8-9	r	y	5-6	m	w	N. C.				**	**	**	**					**							
Tenderpulp.....	8-9	r	b	4-5	m	w	S. C.				**	**	**	**					**	**						
Thomas.....	6-7	r	b	7-8	c	w	S. C.				**	**	**	**					**	**						

SUBSECTION 5.—*V. VINIFERA*.

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, oval; r, round. Color: a, amber; b, black; g, green; p, purple; r, red; w, white; y, yellow. Flavor: m, muscat; s, sweet. Season: e, early; l, late; m, medium; v, very. Use: t, table; w, wine; f, raisin. Abbreviations of names of places of origin: Eur., Europe; For., Foreign.]

Alexandria, Muscat of	8-9	ov	w	m	l	r	Africa																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Section 9.—NECTARINES AND PEACHES. (*Persica vulgaris*.)SUBSECTION 1.—NECTARINES. (*P. VULGARIS* var. *LÆVIS*)

[KEY.—Size, scale 1 to 10; 1, very small; 10, very large. Form: c, compressed; o, oblate; ov, oval; r, round. Color: c, creamy; g, green; r, red; w, white; y, yellow. Adhesion: c, cling; f, free; s, semicling. Quality, scale 1 to 10; 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Belg., Belgium; Eng., England; Eur., Europe; Fr., France.]

Name.	Description.						Districts and starting.																					
	Size.	Form.	Color.		Adhesion.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			Skln.	Flesh.																								
Boston.....	7-8	rov	yr	y	f	5-6	m	d	Mass.		*	*					*											*
Downton.....	7-8	rov	gr	gr	f	5-6	ve	d	Eng.				*															*
Early Newington.....	7-8	rov	gr	gr	c	9-10	e	d	Eng.				*									*						*
Early Violet.....	7-8	r	yr	wr	f	7-8	ve	d	Fr.				*								*							*
Elruge.....	5-6	rov	gr	g	f	7-8	l	d	Eng.												*							*
New White.....	6-7	r	w	w	f	6-7	dm	dm	Eng.		*	*		*			*					*						*
Stanwick.....	6-7	rov	gr	w	f	4-5	l	d	Eng.					*			*					*						*

SUBSECTION 2.—PEACHES. (*P. VULGARIS*.)

Albright.....	7-8	r	w	cw	c	7	l	dm	N. C.																				
Alexander.....	5-6	r	wr	yt	s	5-6	ve	dm	Ill.																				
Allen October.....	7-8	r	yt	w	f	5	e	dm	Mo.																				
Amelia.....	7-8	r	wr	w	f	7-8	e	dm	N. C.																				
Ameliaberta.....	6	r	y	y	f				Ga.																				
Angel.....	7-8	r	wr	gw	f	7-8	o	dm	Fla.																				
Banner.....	7-8	ov	yt	yt	f	5-6	l	km	N. J.																				
Beers Snook.....	7-8	rol	gr	gr	c	6-7	me	m	Tex.																				
Bequett Cling.....	7-8	rol	gr	gr	f	6-7	me	m	Tex.																				
Bequett Free.....	7-8	rol	gr	gr	c	6-7	me	m	Tex.																				
Bergen Yellow.....	8-9	r	yt	y	f	8-9	m	d	Am.																				
Bigwell Early.....	4-5	ov	wr	gw	c	5-6	ve	dk	Fla.																				
Bigwell Late.....	5-6	ov	wr	gw	c	7-8	l	dk	Fla.																				
Billwell.....	7-8	r	gw	w	f	6-7	vl	dkm	Md.																				
Billyou.....	7-8	r	y	y	f	8	ml	m	Cal.																				
Blahop Early.....	7	rov	y	y	f	8	ml	m	Cal.																				
Blood Cling.....	8-9	rov	y	yt	c	5-6	vl	k	Am.																				
Blood Free.....	8-9	rov	y	yt	f	5-6	vl	k	Am.																				
Brandywine.....	8-9	rol	yt	yt	f	6	mo	m	Del.																				
Brigdon (<i>Garfield</i>).....	5-6	rov	yt	yt	f	7-8	m	dm	N. Y.																				
Cabler Indian.....	8-9	r	r	r	c	4-5	m	k	Tux.																				

[illegible]

¹The distinctive peculiarities of the families or strains of peaches known as Chinese, Persian, and Spanish being more or less ill defined and obscured by crossing or hybridization, a correct classification of varieties under these heads is not deemed practicable.

Section 9.—NECTARINES AND PEACHES. (*Persica vulgaris*.)—Continued.SUBSECTION 2.—PEACHES. (*P. VULGARIS*).—Continued.

Name.	Description.						Districts and starting.																					
	Size.	Form.	Color.		Adhesion.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
			Skin.	Flesh.																								
Morris White.....	7-8	ov	cw	w	f	5-6	m	km	Am.																			
Mountain Rose.....	6-7	r	w	y	f	8-9	em	dm	N. J.	*							*											
McNair.....	8-9	obc	yr	y	c	8-9	m	dkm	Cal.																			
McDevitt.....	7-8	rov	c	w	f	7-8	m	km	Am.																			
Oldmixon Cling.....	7-8	rov	c	w	f	8-9	m	dm	Am.																			
Oldmixon Free.....	7-8	ov	w	w	f	7-8	m	dm	Tex.																			
Onderdonk.....	7-8	r	y	y	c	5-6	m	km	Ga.																			
Orange Cling.....	7-8	ov	yw	w	f	6-7	e	mk	Am.																			
Parham.....	5-6	f	yw	w	f	5-6	e	d	Ga.																			
Peen to.....	4-5	f	w	w	f	7-8	e	d	Ga.																			
Peninsula.....	7-8	o	y	y	c	7-8	m	dm	Md.																			
Phillips Cling.....	7-8	ov	y	y	c	7-8	m	dm	Cal.																			
Picquet.....	7-9	r	yr	y	f	5-6	l	d	Ga.																			
Prize.....	7	ob	y	y	c	8	l	m																				
Red Cheek <i>McClellan</i>	7-8	rov	yr	y	f	6-7	m	dm	Am.																			
Reeves Favorite.....	8-9	rov	yr	y	f	7-8	m	m	N. J.																			
Richmond.....	8-9	r	yr	y	f	6-7	m	m	N. Y.																			
Rivers.....	6-7	ro	cw	w	f	7-8	e	dm	Eng.																			
Royal George.....	5-6	r	w	w	f	10	e	d	Eur.																			
Russell.....	7-8	r	wr	w	f	7-8	l	dkm	Nehr.																			
Salway.....	7-8	rov	vr	y	f	5-6	e	m	Eng.																			
Smock.....	7-8	ov	vr	y	f	5-6	ve	m	N. J.																			
Snow.....	6-7	ov	gw	w	f	4-5	m	dm	Tenn.																			
Stevens <i>Herbert</i>	7-8	r	ov	w	f	6-7	m	dm	Am.																			
St. John.....	6-7	rov	cw	w	f	7-8	ml	m	N. J.																			
Stonewall <i>Jackson</i>	7-8	r	yr	y	f	7-8	e	m	Am.																			
Strawberry.....	7-8	ro	gy	g	c	6-7	e	km	Tex.																			
Stump.....	5-6	ov	r	w	f	7-8	m	dm	N. J.																			
Suebehanna.....	8-9	rov	wr	w	f	6-7	eml	dm	N. Y.																			
Texas.....	9-10	r	yr	y	f	8-10	m	l	Pa.																			
Thurber.....	4-5	ro	yg	g	c	5-6	d	d	Tex.																			
Tillotson.....	6-7	rov	wr	w	f	7-8	e	d	Ga.																			
Tippecanoe.....	5-6	r	wr	w	f	7-8	e	d	N. Y.																			
Triumph.....	8-9	r	yr	y	f	6-7	l	dm	Pa.																			
Triumph.....	5-6	r	yr	y	f	8-9	e	dm	Ga.																			

Troth.....	8-4	r	wgr	wr	f	5	me	m	N. J	*	*	*	*	*	*	*	*	*	*
Tuskens.....	8-5	oo	y	yr	c	7-8	e	dkm	South.	*	*	*	*	*	*	*	*	*	*
Wager.....	8-6	ov	y	y	f	4-5	m	m	N. Y	*	*	*	*	*	*	*	*	*	*
Waldo.....	4-5	ov	w	w	f	6-7	e	dm	Fa	*	*	*	*	*	*	*	*	*	*
Walker Var. Free	8	o	wr	wr	f	7-8	l	dm	Del.	*	*	*	*	*	*	*	*	*	*
Ward Late.....	7-8	rov	w	w	f	7-8	vl	dk	Am.	*	*	*	*	*	*	*	*	*	*
Waterloo.....	8-6	r	wr	gw	s	5-6	ve	dm	N. Y	*	*	*	*	*	*	*	*	*	*
Wheatland.....	9-10	r	yr	y	f	6-7	m	dm	N. Y	*	*	*	*	*	*	*	*	*	*
Yellow Kearsipe.....	7-8	r	yr	y	f	7-8	m	dm	Am.	*	*	*	*	*	*	*	*	*	*

Section 10.—PEARS. (*Pyrus communis* and *sinensis*.)

[Key.—Size, scale 1 to 10; 1, very small; 10, very large. Form: i, irregular; o, oblate; ob, oblong; obo, obovate; obt, obtuse; ov, ovate; p, pyriform; r, round; t, turbinate. Color: b, brown; c, crimson; g, green; r, red; ru, russet; y, yellow. Texture: b, buttery; f, firm; g, granular; m, melting; t, tender. Flavor: a, acid; as, astringent; j, juicy; s, sweet; v, vinous; p, perfumed. Quality, scale 1 to 10; 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Belg., Belgium; Eng., England; Eur., Europe; Flem., Flemish Provinces; Fr., France; Hol., Holland.]

Name.	Description.							Districts and starring.																				
	Size.	Form.	Color.	Texture.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Alamo.....	6-7	p	ybru	bm	sp	5-6	em	p	Tex							*												
Ananas d'Ete.....	6-7	pl	gyr	bm	v	4-5	e	d	Hol																			
Andrews.....	6-10	obobo	gyru	b	y	5-9	e	dm	Mass																			
Angouleme, <i>Duchess de</i>	7-8	obtp	gre	m	vp	8-9	m	dm	Fr							*	*	*	*	*	*	*	*	*	*	*	*	*
Anjou.....	4-5	rob	gyru	m	sv	4-5	e	m	Fr							*	*	*	*	*	*	*	*	*	*	*	*	*
Anault.....	8-9	obop	gyru	bm	jp	4-5	m	dm	Fr							*	*	*	*	*	*	*	*	*	*	*	*	*
Archangel.....	7-8	obobtp	gyru	bt	jp	6-8	em	dm	Eng							*	*	*	*	*	*	*	*	*	*	*	*	*
Barlett.....	5-6	cobo	y	g	js	4-5	e	m	Rus							*	*	*	*	*	*	*	*	*	*	*	*	*
Bassamanka.....	4-5	topo	gyru	m	sp	6-7	e	d	N. Y.†							*	*	*	*	*	*	*	*	*	*	*	*	*
Bloodgood.....	5-6	rop	gyru	t	js	6-7	i	e	Fr							*	*	*	*	*	*	*	*	*	*	*	*	*
Bordeaux, <i>Duchess de</i>	8-9	p	yrur	mb	p	8-9	m	dm	Belg							*	*	*	*	*	*	*	*	*	*	*	*	*
Bosc.....	7-8	obop	gyru	bm	jp	6-8	m	dm	Belg							*	*	*	*	*	*	*	*	*	*	*	*	*
Boussock.....	5-6	p	gyru	m	jp	6-7	e	m	Pa							*	*	*	*	*	*	*	*	*	*	*	*	*
Brandywine.....	5-6	obobo	yr	b	sv	6-7	m	km	Ri							*	*	*	*	*	*	*	*	*	*	*	*	*
Budum.....	4-5	robo	yr	gf	s	4-5	ve	d	Md.†							*	*	*	*	*	*	*	*	*	*	*	*	*
Chambers.....	7-8	p	yc	yc	jp	4-5	l	m	Fr							*	*	*	*	*	*	*	*	*	*	*	*	*
Clapp Favorite.....	7-8	obop	yc	bm	sv	6-6	em	m	Mass							*	*	*	*	*	*	*	*	*	*	*	*	*
Columbia.....	8-9	obo	y	m	jp	6-7	l	m	N. Y							*	*	*	*	*	*	*	*	*	*	*	*	*
Comice, <i>Doyenne du</i>	8-9	rp	yc	mb	jp	8-9	ml	dm	Fr							*	*	*	*	*	*	*	*	*	*	*	*	*
Danas Hovey.....	3-4	obop	yr	mb	jp	9-10	l	m	Pa							*	*	*	*	*	*	*	*	*	*	*	*	*
Del.....	8-9	obop	gyru	gb	sv	5-6	l	d	Mass							*	*	*	*	*	*	*	*	*	*	*	*	*
Drouard, <i>President</i>	8	ovl	gy	t	sp	5-6	l	m	Fr							*	*	*	*	*	*	*	*	*	*	*	*	*

Section 10.—PEARS. (*Pyrus communis* and *sinensis*).—Continued.

Name.	Description.						Districts and starting.																					
	Size.	Form.	Color.	Texture.	Flavor.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Easter Beurre.....	7-8	robo	ygru	bm	ja	5-6	vl	d	Eur.																			
Elizabeth, Manning's.....	4-5	obop	yr	m	jap	6-7	e	d	Belg.																			
Flemish Beauty.....	8-9	obob	yru	m	jap	6-7	em	d	Belg.																			
Frederick Clapp.....	6-7	rp	y	m	jvp	5-6	m	dm	Mass.																			
Garber.....	7-8	robp	yr	fg	ja	3-4	m	km	Pa.																			
Gishlain.....	5-6	p	y	b	jrich	4-5	m	d	Belg.																			
Giffard.....	5-6	p	gyr	m	jvp	7-8	e	dm	Fr.																			
Glout Moreau.....	6-7	obop	gyb	bm	stich	6-9	l	d	Flem.																			
Goodale.....	7-8	obp	yru	mg	svp	5-6	m	dm	Me.																			
Grand Isle.....	5	e	gy	m	a	7	m	dm	Vi.																			
Gray Doyenne.....	5-6	ovobo	ru	bm	rich	8-9	m	d	Fr.																			
Hardy Beurre.....	7-8	obop	grur	bm	jv	6-8	m	m	Eur. I.																			
Hayak, Entle de.....	8-9	obp	yru	m	svp	8-9	m	d	Belg.																			
Howell.....	6-7	rp	yr	m	jv	5-6	m	dm	Conn.																			
Idaho.....	8-9	obop	yru	m	sv	8-9	m	dm	Idaho																			
Kieffer.....	7-9	rov	yru	gm	ja	3-5	m	mk	Pa.																			
Kirtland.....	4-5	obobop	yru	mg	v	3-4	l	d	Ohio.																			
Langslet.....	5-6	obop	yru	m	jap	7-8	e	dm	Eng.																			
Lawrence.....	5-6	obop	yru	m	s	3-4	m	m	N. Y.																			
Le Conte.....	7-8	robp	yr	m	sp	6-7	e	d	Fr.																			
Lawson.....	6-7	obo	yr	fg	s	3-4	e	m	N. Y.																			
Lincoln.....	6-7	obop	yr	bm	s	7-8	e	m	Ill.																			
Louise Bonne de Jersey.....	6-7	obp	gru	m	j	5-6	m	dm	Fr.																			
Lucrative, Belle.....	5-6	obop	yru	m	s	7-9	m	dm	Flem.																			
McLaughlin.....	7-8	obp	yru	m	jvp	4-5	l	dm	Me.																			
Madeleine.....	4-5	obop	ygb	m	sp	6-7	e	d	Fr.																			
Magnolia.....	7-8	obgr	ru	m	.....	5	l	mk	Ga.																			
Mallines, Josephine de.....	5-6	rop	gyru	m	jap	7-8	e	dm	Belg.																			
Marguerite, Petite.....	4-5	obtp	ygb	bm	jap	5-6	e	d	Fr.																			
Marie Louise.....	6-7	obp	gyru	bm	jvas	5-6	m	dm	Belg.																			
Merriam.....	5-6	ro	yru	gm	jvp	4-5	m	dm	Mass.																			
Mount Vernon.....	6-7	obtp	yru	gm	jvp	5-6	m	dm	Mass.																			
Napoleon.....	6-7	obtp	gy	m	ja	5-6	m	km	Belg.																			
Onondaga (Swan's Orange).....	8-9	obtp	yru	bm	jv	6-7	m	km	Conn.																			
Osband Summer.....	8-9	obtp	yru	bm	jap	5-6	e	dm	N. Y.																			
Ott.....	3-4	obop	gyru	m	sp	4-5	e	dm	Pa.																			
Paradise d'Automne.....	7-8	obp	yru	gm	jvp	5-6	e	dm	Belg.																			
Pound.....	8-9	p	ygb	fg	v	2-3	vl	k	Eur.																			

Section 11.—PLUMS. (Prunus.)

SUBSECTION 1.—P. AMERICANA.

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, compressed; f, flattened; o, oval; ob, obovate; obl, oblong; r, round. Color: b, black; br, brown; g, green; p, purple; r, red; v, violet; w, white; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late; v, very. Use: d, dessert; k, kitchen; m, market; c, curing. Abbreviations of names of places of origin: Am., America; Belg., Belgium; Eng., England; Eur., Europe; Fr., France; Ger., Germany; Jap., Japan; Ont., Ontario; Rus., Russia.]

Kestiezer	3-4	obop	yrb	mb	avp	8-9	e	d	Eur.	*	*	*	*	*	*	*	*
Rutter	6-7	rp	gyru	fm	jp	5-6	m	dm	P.	*	*	*	*	*	*	*	*
Sells	3-4	robo	gyru	gm	jp	9-10	m	dm	P.	**	**	**	**	**	**	**	**
Sheldon	6-8	robo	grub	m	japv	7-9	ml	dm	N.Y.	*	*	*	*	*	*	*	*
Smith	7-8	roy	yr	t	vss	3-4	m	km	South	**	**	**	**	**	**	**	**
Souvenir du Congress	7-9	obobtp	yr	bt	jyp	5-6	em	m	Fr.	*	*	*	*	*	*	*	*
Sterling	5-6	rop	ymc	m	is	4-5	e	dm	N.Y.	*	*	*	*	*	*	*	*
Stevens	7-8	r	y	b	sp	4-5	e	d	N.Y.	*	*	*	*	*	*	*	*
Summer Doyenne	2-3	robo	yr	m	js	6-7	ve	d	Belg.	*	*	*	*	*	*	*	*
d'Eté	6-7	rp	yeru	bm	v	8-9	m	km	Fr.	*	*	*	*	*	*	*	*
Superfine	4-5	p	yruc	m	jap	8-9	m	dm	P.	**	**	**	**	**	**	**	**
Tyson	4-5	p	yruc	m	jap	8-9	m	dm	Belg.	*	*	*	*	*	*	*	*
Urbanlake	5-6	obop	yruc	bm	jp	7-8	ml	dm	Vt.	*	*	*	*	*	*	*	*
Vermont Beauty	4-5	obob	yruc	t	s	8-9	l	dm	Vt.	*	*	*	*	*	*	*	*
Vicar of Watfield	7-8	p	yb	b	js	4-5	l	km	Fr.	*	*	*	*	*	*	*	*
Washington	5-6	ovobo	vr	bs	js	5-6	e	d	Del.	*	*	*	*	*	*	*	*
White Doyenne	5-6	obo	vr	bm	jap	8-10	ml	dm	Fr.	*	*	*	*	*	*	*	*
Wildier Early	4-5	obobrr	yr	t	sv	7-8	e	dm	N.Y.	*	*	*	*	*	*	*	*
Winter Nells	5-6	robo	ygru	bm	jap	8-9	l	dm	Belg.	*	*	*	*	*	*	*	*

[illegible]

Section 11.—PLUMS, (*Prunus*).—Continued.SUBSECTION 1.—*P. AMERICANA*—Continued.

Name.	Description.						Districts and starting.																			
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Piper.....	7	r	r	8	l	dk	Minn								†	†										
Quaker.....	8	ro	ry	8	e	dk	Iowa.	*							*	*										
Rockford.....	5-6	ro	yr	8-9	m	d	Iowa.	*							*	*										
Rollingstone.....	6-7	ro	r	6-7	m	dk	Minn	*							*	*										
Stoddard.....	8-9	r	r	5	me	m	Iowa.			**	†				†	†										
Surprise.....	7-8	r	dr	9-10	m	dm	Minn								*	*										
Weaver.....	5-6	oc	r	5-6	m	km	Iowa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wolf.....	6-7	ro	r	6-7	m	km	Iowa.	**	*	*	*	*	*	*	**	**	*	*	*	*	*	*	*	*	*	*
Wyant.....	4-5	ro	yr	5-6	m	k	Iowa.	*	*	*	*	*	*	*	**	**	*	*	*	*	*	*	*	*	*	*

SUBSECTION 2.—*P. ANGUSTIFOLIA*.

Caddo Chief.....	5-6	o	r	6	ve	dm	La.				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cluck.....	5	o	r	5	me	m	Tex.								*	*	*	*	*	*	*	*	*	*	*	*
Lone Star.....	2-3	o	r	3	m	k	Tex.								*	*	*	*	*	*	*	*	*	*	*	*
Munson.....	5	o	r	5	me	m	Tex.								*	*	*	*	*	*	*	*	*	*	*	*
Newman.....	5-6	o	r	3-4	m	km	Ky.								*	*	*	*	*	*	*	*	*	*	*	*
Pottawattamie.....	5-6	r	r	3-4	ml	km	Tenn.								*	*	*	*	*	*	*	*	*	*	*	*
Texas Belle (<i>Paris Belle</i>).....	5-6	r	r	5-6	m	km	Tex.								*	*	*	*	*	*	*	*	*	*	*	*
Yellow Transparent.....	7-8	o	y	5-6	e	km	Tex.								*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 3.—*P. CERCASIFERA*.¹

De Caradent.....	5-6	r	dr	2-4	o	k	S.C.				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Marianna.....	5-6	r	r	2-4	l	km	Tex.								*	*	*	*	*	*	*	*	*	*	*	*

¹ Includes supposed hybrids.

[illegible]

Section 11.—PLUMS. (Prunus.)—Continued.

SUBSECTION 4.—P. DOMESTICA—Continued.

Name.	Description.					Districts and starting.																				
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
St. Ann, Bonne	8-9	ro	b	7-8	ml	dm	Vt.	*																		
Sharp Emperor	8-9	o	yp	3-4	e	km	Eng.	*									*									
Smith Orleans	8-9	o	rp	4-6	e	m	N. Y.	*															*			
Tennant						m	Wash.																			
Tragedy	6-6	o	rp	7-8	e	dk	Cal.	**															*			
Transparent Gage	6-7	rf	gr	8-9	m	dk	Fr.	*															*			
Wales, Prince of	8-9	robl	rp	8-9	m	m	Eng.	*									*					*				
Wangenheim	5-6	o	p	5-6	e	m	Ger.	*			*											*				
Washington	8-9	ro	ypc	7-8	em	dm	N. Y.	*			*						*				**	*	*	*		
Willamette	7-8	o	rbr	8-9	me	dem	Oreg.	*							*		*				**	*	*	*		
Yellow Egg	8-9	o	y	3-4	e	km	Eur.	*	**	—	*	*	*	*	*	*	*	*	*	**	**	*	*	*	*	*

SUBSECTION 5.—P. HORTULANA.

Name.	Description.					Districts and starting.																				
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MINER GROUP.																										
Miner	5-6	r	r	5-6	ml	km	Tenn.	*	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Prairie Flower	5	ro	r	5	ml	m	Mo. l.	*	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WAYLAND GROUP.																										
Benson	4-5	r	y	6	l	mk	Nebr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cumberland	5-6	r	y	4-5	l	km	Ga.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Golden Beauty	4-5	ro	y	4-5	ml	km	Tex.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Moreman	5	r	dr	5-6	l	km	Ky.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Reed	3-4	r	r	6	l	mkd	N. J.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WILDOOSE GROUP.																										
Choptank	5	ro	r	5	ml	m	Md.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Downing, Charles	6-7	ro	r	5-6	me	m	Iowa.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Dunlap No. 2	6	ro	r	5	e	m	Nebr.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Indian Chief	6-7	r	r	8	l	km	Tex.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Milton	5	ro	r	5	l	m	Iowa	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Roulette	6	ro	r	5	me	m	Tex.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Smiley	5	ro	r	5	me	m	Ala.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

SUBSECTION 6.—P. TRIFLORA.

[illegible]

¹ Belongs to species *Prunus Simonii*.

SUBSECTION 7.—P. PUMILA.

Minnie.....	8	r	br	5	me	k	Man
Brandon.....	2	r	br	me	me	k	Man
Challenge.....	3	r	me	me	me	k	Man
Othello.....	3	r	br	me	me	k	Man
Progress.....	3	r	br	me	me	k	Man
Standard.....	1	r	br	me	me	k	Man
Victor.....	4	r	br	5	me	k	Man

Section 12.—QUINCES. (*Cydonia vulgaris*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, oblate; ob, obtuse; p, pyriform; r, roundish. Color: g, greenish; o, orange; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late. Use: k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Fr., France; Ont., Ontario; Port., Portugal.]

Name.	Description.						Districts and starring.																			
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Champion	6-7	obp	gy	8-9	m	km	Am...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Meech	7-8	ro	oy	6-7	m	km	Conn.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Missouri Mammoth	9-10	ro	oy	8-9	e	km	Mass.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Orange (Apple)	8-9	ro	oy	8-9	e	km	Am...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pear	8-9	p	oy	7-8	em	km	Am...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rea	8-9	rob	py	7-8	e	km	N.Y.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Section 13.—RASPBERRIES. (*Rubus*.)SUBSECTION 1.—*R. IDÆUS*.¹

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; ob, obtuse; r, roundish. Color: b, black; c, crimson; p, purple; r, red; s, scarlet; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Eng., England; Eur., Europe; Fr., France; Ont., Ontario.]

Name.	Description.						Districts and starring.																			
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Clarke	7-8	o	c	7-8	e	d	Conn.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pastor	9-10	rc	pr	7-8	e	d	Eng.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Francis	8-9	oc	pr	7-8	m	dm	Fr.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ridgson River Antwerp	8-9	o	r	7-8	m	m	Eng.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Orange (Brindley's Orange)	8-9	rc	y	8-9	m	d	Pa.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Red Antwerp	7-8	roc	r	8-9	m	d	Eur.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Vermont	6-7	ro	y	8-9	l	dk	Vt.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

¹Includes possible hybrids.

Section 14.—STRAWBERRIES. (Fragaria.)

[**KEY.**—Sex: b, bisexual; p, pistillate. Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; co, compressed; l, long; o, oblate; ob, oblong; ov, ovate; r, roundish; i, irregular. Color: c, crimson; d, dark; l, light; r, red; s, scarlet. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; m, medium; l, late. Use: d, dessert; m, market. Abbreviations of names of places of origin: Am., America; Austr., Australia; Can., Canada; Ont., Ontario.]

Name.	Description.					Districts and starring.																					
	Sex.	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Arizona Everbearing	b	4-5	ro	bs	5-6	m	dm	Austr																			**
Australian Crimson	b	7-8	obci	dc	8-9	m	dm	Ill																			**
Bederwood	b	5-6	cl	dc	7-8	m	dm	Ohio																			
Belt, William	b	7-9	re	c	7-8	m	dm	Mass																			
Beverly	b	7-8	re	c	7-8	m	dm	Ark																			
Bismark	b	7-8	re	r	8	m	dm	Ind																			
Blonde	b	8-10	oc	r	8	m	dm	Pa																			
Brandywine	b	8-9	re	c	8-9	ml	dm	Ind																			
Brunette	p	7-9	r	dr	5	e	m	Ill																			
Bubach No. 5	p	8-9	rob	s	10	e	m	Mo																			
Captain Jack	b	7	r	r	6	m	d	Va																			
Carrie	p	7-8	l	c	7-8	m	m	Pa																			
Champion	p	6-7	re	s	5-6	e	m	La																			
Cloud	p	6-7	co	lc	6-7	e	dm	Pa																			
Clyde	b	7-8	lc	c	7-8	em	m	Kans																			
Crawford	b	7-8	re	lc	7-9	m	dm	Ohio																			
Crecent	p	5-6	re	bs	6-7	e	m	Conn																			
Cumberland	p	9-10	ro	bs	6-6	m	m	Pa																			
Dollar	b	7-9	re	lc	8-9	m	d	N.J.?																			
Downing	b	6-7	c	ds	6-7	m	dm	Ky																			
Enhance	p	7-8	c	bs	7-8	m	dm	Ohio																			
Enormous	p	8-9	qo	dc	7-8	ml	dm	Ill																			
Eureka	p	6-7	r	br	6-8	ml	dm	Ohio																			
Excelior	p	6-7	c	r	6-7	ve	d	Ark																			
Gandy	b	7-8	c	bs	7-8	l	dm	N.J.																			
Gardner	b	5-6	lc	bs	7-8	m	dm	Iowa																			
Glen Mary	b	8-9	roo	c	7-8	m	dm	Pa																			
Greenville	b	8-9	roo	c	7-8	m	dm	Pa																			
Haverland	p	7-8	roc	bc	7-8	e	dm	Ohio																			
Hofman	p	6-7	coo	s	7-8	m	dm	N.J.																			
Hood River	p	5-6	c	dc	7-8	m	dm	S.C.																			
Jessie	b	9-10	lc	bs	8-9	m	dm	Oreg																			
Loret	b	6-7	lc	dc	8-9	em	dm	Wis																			
Magoon	b	9-10	lc	bs	8-9	m	dm	Ky																			
Manchester	p	5-6	oc	s	7-8	ml	dm	N.J.																			
Marshall	p	8-9	re	dr	7-9	m	dm	Mass																			
Meek Early	b	3-4	re	dc	5-6	eo	m	Md																			

Section 15.—NUTS.

SUBSECTION 1.--ALMONDS. (AMYGDALUS COMMUNIS.)

[**KEY.**—Size: Scale, 1 to 10; 1, very small; 10, very large. Form: b, broad; l, long; v, very. Flavor: s, sweet. Shell: a, soft; t, thin; v, very. Abbreviation of name of place of origin: Eur., Europe.]

[illegible]

Name.	Description.					Districts and starring.																		
	Size.	Form.	Quality.	Shell.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Drake	7-8	d	7-8	t	Cal																*		**	*
Golden State	6-7	bl	6-7	s	Cal																		*	*
Harriott	7-8	l	7-8	s	Cal																		*	*
I X L	8-9	lb	8-9	s	Cal																		**	**
King Soft Shell	6-7	b	7-8	vat	Cal																*	*	*	*
Langedoc	5-6	b	7-8	t	Kur.																*	*	*	*
No Plus Ultra	8-9	vl	8-9	s	Cal																*	*	.....	.....

SUBSECTION 2.—CHESTNUTS. (*CASTANEA* SPECIES.)

[KEY.—Size: Scale, 1 to 10; 1, very small; 10, very large. Quality: b, best; g, good; v, very. Abbreviation of name of place of origin: Eur., Europe; Fr., France; Jap., Japanese.]

Name.	Description.			Districts and starting.																			
	Size.	Qual- ity.	Species.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
"American Sweet"			<i>dentata</i>	Am.																			
Anderson	5-6	5-6	<i>castanea</i>	N. J.																			
Alpha	6-8	5-6	<i>japonica</i>	N. J.			*															*	
Bartam	5-6	5-6	<i>castanea</i>	Pa.			*																
Beta	5-6	5-6	<i>castanea</i>	N. J.			*																
Biddle	7-8	5-6	<i>japonica</i>	N. J.			**																
Black	6-7	5-6	<i>japonica</i>	N. J.			*																
Coe	7-8	7-8	<i>japonica</i>	Cal.			†																
Comhale, Marron	8-9	5-6	<i>castanea</i>	Fr.																			
Comfort	7-8	6-7	<i>castanea</i>	Pa.			*																
Cooper	6-7	7-8	<i>castanea</i>	N. J.			*																
Corson	6-7	8-9	<i>castanea</i>	Pa.			*																
Dager	5-6	6-7	<i>castanea</i>	Del.			*																
Darlington	6-7	6-7	<i>castanea</i>	Del.			*																
Felton	6-7	8-9	<i>japonica</i>	Del.			*																
Hale	7-8	7-8	<i>japonica</i>	Cal.			*																
Hathaway	3-4	9-10	<i>dentata</i>	Mich.																			
"Italian or Spanish"			<i>castanea</i>	Eur.			*																
Japan			<i>japonica</i>	Jap.			*																
Kent	6-7	5-6	<i>japonica</i>	N. J.			**																
Kerr	7-8	7-8	<i>japonica</i>	N. J.			*																
Killen	9-10	8-9	<i>japonica</i>	N. J.			*																
McFarland	8-9	8-9	<i>japonica</i>	Cal.			†																
Martin	8-9	5-6	<i>japonica</i>	N. J.			*																
Miller	5-6	5-6	<i>castanea</i>	Pa. I			*																
Moncur	5-6	7-8	<i>castanea</i>	Del.			*																
Murrell	4-5	9-10	<i>dentata</i>	Va.																			
Nouillard			<i>castanea</i>	Fr.																			
Numbo	7-8	7-8	<i>castanea</i>	Pa.			*																
Paragon	7-8	7-8	<i>castanea</i>	Pa.			*																
Parry	9-10	5-6	<i>japonica</i>	Jap.			*																
Prolific	5-6	5-6	<i>japonica</i>	Jap.			*																
Reliance	6-7	5-6	<i>japonica</i>	N. J.			*																
Ridgely	6-7	7-8	<i>castanea</i>	Del.			*																
Scott	5-6	5-6	<i>castanea</i>	N. J.			*																
Success	8-9	6-7	<i>japonica</i>	N. J.			*																
Superb	7-8	6-7	<i>japonica</i>	N. J.			*																
Styer	5-6	5-6	<i>castanea</i>	Pa.			*																

SUBSECTION 3.—FILBERTS AND HAZELNUTS. (*CORYLUS AVELLANA*.)

[KEY.—Size: Scale 1 to 10; 1, very small; 10, very large. Form: ob, oblong; ov, oval; r, round. Quality: g, good. Abbreviation of name of place of origin: Eur., Europe.

Name.	Description.				Districts and starring.																		
	Size.	Form.	Quality.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Du Chilly	7-8	ob	8-9	Eur.																			*
Jones	5-6	ob	6-7	Del						*													
Purple Leaf	6-7	ob	6-7	Eur.						*													

SUBSECTION 4.—PECANS. (*HICORIA PECAN*.)

[KEY.—Size: Scale 1 to 10; 1, very small; 10, very large. Form: c, conical; l, long; ob, oblong; ov, oval; r, round. Quality: g, good; v, very.]

Name.	Description.				Districts and starting.																		
	Size.	Form.	Quality.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Centennial.....	9-10	ob	7-8	La...							*												
Columbian.....	8-9	ob	8-9	La...					**	**													
Procter Egg Shell.....	8-9	ob	8-9	La...					*	*													
Jewett.....	9-10	ov	7-8	Miss...						*													
Russell.....	8-9	ob	8-9	Miss...					**	**													
San Saba.....	8-9	ov	9-10	Tex...						*				*									
Stuart.....	8-9	rob	8-9	Miss...					**	**													
Van Deman.....	8-9	ob	8-9	Miss...					**	**													

SUBSECTION 5.—PERSIAN, ENGLISH, OR EUROPEAN WALNUTS. (*JUGLANS REGIA*.)

[Key.—Size: Scale 1 to 10; 1, very small; 10, very large. Form: l, long; ob, oblong; ov, ovate; r, round. Quality: g, good; v, very. Abbreviation of name of place of origin: Fr., France.]

Name.	Description.			Districts and starring.																		
	Size.	Form.	Quality.	Origin.																		
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Ford Soft Shell.....	8-9	lov	6-7	Cal																	*	**
Franquette.....	8-9	lov	8-9	Fr.																	*	---
Mayette.....	7-8	lov	8-9	Fr.																	*	---
Mission (<i>Los Angeles</i>).....	6-7	rov	6-7	Cal																	*	---
Parisienne.....	8-9	rob	8-9	Fr.																	*	*
Preparations.....	5-6	ov	7-8	Fr.																	*	*

Division II.—SUBTROPICAL AND TROPICAL FRUITS.

This division includes such species only as, under cultivation or otherwise, have so far varied that the departures from the original types are recognized under varietal names.

The climate of the portion of Florida lying south of 27° north latitude is so far modified by its seminsular position, together with the softening influence of the almost tepid waters of the adjacent Gulf Stream, as practically to adapt it to the successful cultivation of very many strictly tropical fruits. Such, therefore, as are recommended for cultivation in this region are indicated by the letter s in connection with the starring of District No. 6, of which this territory forms a part. A few of the more hardy subtropical fruits, though not succeeding in all portions of District 6, are successful in favored localities in adjacent portions of Districts 5 and 7.

Section 1.—CITRIOUS FRUITS.

SUBSECTION 1.—BITTER ORANGES. (*CITRUS BIGARADIA*.)

[KEY.—Size, scale 1 to 10; 1, very small; 10, very large. Form: o, oblate; ob, oblong; ov, oval; r, round. Color: d, dark; l, light; o, orange; y, yellow. Quality, scale 1 to 10; 1, very poor; 10, best. Season: e, early; l, late; m, medium; v, very. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: Am., America; Baha., Bahamas; Braa., Brazil; For., Foreign; Jap., Japan; Port., Portugal.]

Name.	Description.						Districts and starring.																			
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Bitter Sweet.....	8-9	ro	do			dk	Fla.						*													
Dwarf.....	8-9	ro	do			k	For.						*													
Phillips Bitter Sweet.....	8-9	ro	do	3-4		dk	Fla.						*													
Sour.....	8-9	ro	do			k	Fla.						*													

SUBSECTION 2.—CITRONS. (*C. MEDICA*.)

Lemon.....	8-9	ov	oy	3-4		k	For..																			
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Section 1.—CITREOUS FRUITS—Continued.

SUBSECTION 3.—KUMQUATS, KINKANS. (*C. JAPONICA*.)

Name.	Description.							Districts and starting.																		
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Maruni.....	23	1	o	.....	.....	dkm	Jap..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nagami.....	23	o	ob	.....	.....	dkm	Jap..	.....	.....	.....	.....	.....	**	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

SUBSECTION 4.—LEMONS. (*C. LIMONUM*.)

Belair	5-6	ov	ly	10	.....	.....	For						**													
Eureka	5-6	ov	ly	3-4	.....	.....	Cal						**												*	**
Genoa	5-6	or	ly	5-6	.....	.....	Italy						**												*	**
Lisbon	5-6	ov	ly	5-6	.....	.....	Port						**												*	**
Sicily	5-6	ov	ly	10	.....	.....	Italy						**												*	**
Villafrauca	5-6	or	ly	10	.....	.....	For						**												*	**

SUBSECTION 5.—LIMES. (*C. ACIDA*.)

Imperial	8-9	ov	y	5-6	.....	.....	For						**												*	*
Mexican	5-6	ov	ly	6-7	.....	.....	For						**												*	*
Persian	5-6	ov	ly	6-7	.....	.....	For						**												*	*
Rangpur	4-5	o	or	10	.....	dkm	India						**												*	*
Tahiti	7-8	ov	ly	10	.....	.....	For						**												*	*
Turanj	10	ob	y	2-3	.....	k	India						**												*	*

SUBSECTION 6.—MANDARINS. (*C. NOBILIS*.)

China	5-6	o	lo	5-6	.....	d	For						*												*	*
Cleopatra	3-4	o	r	6-7	.....	dm	For						**												*	*
Dancy Tangerines	6-7	o	r	8-9	.....	dm	Fla						**												*	*
Japan Tangerines	7-8	o	r	6-7	.....	d	Jap.						**												*	*
King	7-8	o	ro	9-10		dm	Cal						**												*	*
Satsuma	5-6	o	ro	8-9		dm	Jap						**												*	*
Sprack	5-6	o	ro	8-9		dm	Fla						**												*	*
Tangerona	5-6	o	lo	8-9		dm	Braz						!												*	*

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CATALOGUE OF FRUITS.

Section 1.—CITROUS FRUITS—Continued.

SUBSECTION 8.—SWEET ORANGES. (*C. AURANTIUM*).—Continued.

Name.	Description.				Districts and starring.																					
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Yaffa</i>	5-6	r	o	10	m	dm	For																			
<i>Jaffa Blood</i>	3-4	ov	or	10	dm	dm	Fla																			
<i>Lamb Summer</i>	5-6	ov	7-8	vl	dm	dm	Fla																			
<i>Long</i>	5-6	ov	3-5	m	dm	dm	For																			
<i>Magnum Bonum</i>	7-9	r	o	5-6	m	dm	Fla																			
<i>Majorca</i>	5-6	r	o	10	lm	dm	For																			
<i>Maltese Blood</i>	3-4	ov	or	10	m	dm	For																			
<i>Maltese Egg</i>	3-5	ov	o	5-6	dm	dm	For																			
<i>Maltese Oval</i>	7-9	ov	o	5-6	l	dm	For																			
<i>Mays Rest</i>	5-6	r	o	5-6	m	dm	Fla																			
<i>Mediterranean Sweet</i>	7-9	ov	o	5-6	l	dm	For																			
<i>Melitenensis Navel</i>	7-9	ov	o	5-6	e	dm	For																			
<i>Nonpareil</i>	7-9	r	o	6-8	em	dm	Fla																			
<i>Old Vin</i>	7-9	r	o	7-8	dm	dm	Fla																			
<i>Paper Rind St. Michael</i>	3-4	ov	lo	5-6	lm	dm	For																			
<i>Parson Brown</i>	5-6	ov	o	5-6	e	dm	Fla																			
<i>Peerless</i>	5-6	r	o	7-8	m	dm	Fla																			
<i>Pineapple</i>	7-9	r	ov	7-8	m	dm	For																			
<i>Prolific</i>	5-6	r	o	5-6	m	dm	For																			
<i>Ruby</i>	5-6	r	or	7-8	em	dm	For																			
<i>St. Michael</i>	5-6	r	o	6-7	m	dm	For																			
<i>St. Michael Blood</i>	5-6	r	o	10	m	dm	For																			
<i>Saul Blood</i>	5-6	r	or	7-8	m	dm	For																			
<i>Seville, Secret</i>	3-4	r	ob	ve	m	dm	For																			
<i>Star Calyx</i>	7-8	r	o	3-5	ve	dm	For																			
<i>Star Calyx Improved</i>	9-10	rov	o	9-10	em	dm	Cal																			
<i>Thompson</i>	7-9	ov	lo	7-8	l	dm	For																			
<i>Valencia Late</i>	5-6	r	lo	10	m	dm	Fla																			
<i>Vinous, Madam</i>	7-9	r	lo	2-5	m	dm	For																			
<i>White</i>	5-6	r	o	5-6	m	dm	Fla																			
<i>Whittaker</i>	5-6	r	o	5-6	m	dm	Fla																			

Section 2.—FIGS. (*Ficus carica*.)

[KEY.—Size: 2-4, small; 4-7, medium; 7-9, large. Color: a, amber; b, black; bl, blue; br, brown; g, green; p, purple; r, red; v, violet; w, white; y, yellow. Quality: 1-6, good; 6-10, best. Season: s, summer. Use: c, curing; d, dessert; k, kitchen; n, near market. Abbreviation of name of place of origin: For., Foreign.]

Name.	Description.					Districts and starring.																				
	Size.	Color.		Quality.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
		Skin.	Flesh.																							
Adriatic, White.	7-9	gy	r	4-5	dco	For.																				
Angelique (<i>Jaune Hative</i>)	4-7	yw	rw	1-6	dkn	For.																				
Black Ischia.	4-7	rb	r	6-10	dkn	For.																				
Brown Smyrna.				8-9																						
Brunswick (<i>Madonna</i>)	7-9	va	a	1-6	dkn	For.																				
Celestial (<i>Celeste</i>)	2-4	rva	a	6-10	dkn	For.																				
Dottato, White.	5-6	yg	ya	c	For.																					
Genoa, Blue.	4-7	bl		1-6	dkn	For.																				
Lemon.	4-7	y		6-10	dkn																					
Marseillaise, White.	4-7	yw	a	1-6	dco	For.																				
Mission.	7	rv	r	9	dc	Spain.																				
Monaco Bianco.	8-9	big	r	8-9	d	For.																				
Osborn <i>Profige</i> .	7	br	r	7	d	For.																				
Reine Blanche.	8			9	d	For.																				
San Pedro Black.	9-10	vb	r	8-9	d																					
Turkey, Brown.	4-7	br	r	6-10	dkn	For.																				
White Smyrna.																										
Zimetza.	7-9	w		4	mk																					

Section 3.—GUAVAS. (*Psidium*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: ov, oval; r, round. Color: g, green; r, red; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best; Season: a, autumn; s, summer. Use: d, dessert; k, kitchen; m, market. Abbreviations of names of places of origin: S. A., South America; W. I., West India; Mex., Mexico.]

Name.	Description.					Districts and starring.																				
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Apple, <i>P. guajava</i>	5-6	r	g	3-4	sa	dkm	W. I.						**													
Cattley (<i>Strawberry</i>) <i>P. catillanum</i>	3-4	r	r	3-4	sa	dkm	S. A.						**													*
Chinese (Mexican) <i>P. lucidum</i>	3-4	r	y	3-4	sa	dkm	Mex.						**													*
"Common," <i>P. guajava</i>			g		sa	dkm	W. I.						**													*
White Winter, <i>P. guajava</i>	5-6	ov	g	3-4	a	dkm	W. I.						**													*

Section 4.—KAKIS, JAPANESE PERSIMMONS. (*Diospyros kaki*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: c, conical; o, oblate; ob, oblong; obo, obovate; p, pointed; r, round. Color: b, black; br, brown; c, carmine; d, dark; o, orange; r, red; s, salmon. Quality, scale 1 to 10: 1, very poor; 10, best. Season: e, early; l, late; m, medium; v, very. Use: d, dessert; m, market. Abbreviation of name of place of origin: Jap., Japan.]

Name.	Description.					Districts and starring.																				
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Coetata.....	5-6	rep	sr	4-5	l	dm	Jap.																			
Hachiya.....	10	obp	br	4-5	e	dm	Jap.																			
Hiyakume.....	7-8	roobo	or	3-4	m	dm	Jap.																			
Kurokuma.....	7-8	r	br	4-5	m	dm	Jap.																			
Okame.....	7-8	ro	bc	4-5	em	dm	Jap.																			
Taber 119.....	5-6	rp	br	4-5	ve	dm	Jap.																			
Tanenashi.....	7-8	rep	br	10	m	dm	Jap.																			
Tsuru.....	7-8	obp	br	3-4	vl	dm	Jap.																			
Yedolchi.....	5-6	ro	dr	5-6	m	dm	Jap.																			
Yemon.....	7-8	rep	sr	3-4	m	dm	Jap.																			
Zengi.....	3-4	ro	dr	3-4	ve	dm	Jap.																			

Section 5.—OLIVE. (*Olea europæa*.)

[*Key*.—Size: Scale, 1 to 10; 1, very small; 10, very large. Form: o, oblique; ob, obovate; ov, oval; r, round. Color: b, black; d, dark; p, purple; v, violet. Abbreviation of name of place of origin: Fr., France.]

Name.	Description.				Districts and starring.																		
	Size.	Form.	Color.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Ascolano.	5-6	ov	dp	Fr.																	*		*
Columbelle.	8-9	ovob	p	Italy																			*
Macrocarya.	7-8	rov	pb	Spain																			**
Mansanillo.	5-6	ov	pb	Cal																	**		**
Mission.	4-5	ovo	pb	Spain																	*	*	*
Nevadillo Blanco.	7-8	ovv	dp	Fr.																		*	*
Oblonga.	6-7	ov	dp	Fr.																		*	*
Pendulina.	6-7	ov	dp	Fr.																		*	*
Picarella.	4-5	rov	pb	Fr.																		*	*
Ruira.	6-7	ovo	p	Fr. i																	*	*	*
Santa Catarina.	9-10	ovb	p	Spain																	*	*	*
Serrillano.	4-5	ov	dp	Fr.																	*	*	*
Uvaria.	4-5	ov	dp	Fr.																	*	*	*

Section 6.—PINEAPPLES. (*Ananassa sativa*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: o, conical; ob, oblong; r, round. Color: d, dark; l, light; r, red; y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season, s, summer. Use: d, dessert; k, kitchen; m, market. Abbreviation of name of origin: For., Foreign.]

Name.	Description.						Districts and starring.																			
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Abechi (Abakka)	6-7	ob	dy	8-9	s	dk	For						*s													
Albert, Prince.	8-9	c		10	s	dk	For						fs													
Beatrice, Lady	8-9	c		10	s	dk	For						fs													
Black Antigua	8-9	ob	d	10	s	dk	For						fs													
Black Prince	8-9	c		10	s	dk	For						fs													
Blood	5-6	r		4-5	s	dk	For						fs													
Carrington, Lord	8-9	c		10	s	dk	For						fs													
Cayenne, Smooth	8-9	c	y	10	s	dk	For						fs													
Crown Prince	8-9	c		10	s	dk	For						fs													
Egyptian Queen	8-9	c		10	s	dk	For						fs													
Jamaica, Black	8-9	ob	dy	10	s	dk	For						fs													
Kew, Mammoth.	10	c	y	10	s	dk	For						fs													
Pernambuco.	5	ob	y	10	s	d	Brazil						fs													
Porto Rico.	10	r	y	5-6	s	dk	For						fs													
Ripley, Queen	5-6	c	y	8-9	s	dk	For						fs													
Rothschilt, Charlotte	5-6	c		10	s	dk	For						fs													
Spanish, Red	5-6	r	ry	5-6	s	dk	For						fs													
Sugar Loaf	5-6	c		7-8	s	dk	For						fs													
White Antigua	5-6	ob	y	7-8	s	dk	For						fs													

Section 7.—POMEGRANATES. (*Punica granatum*.)

[KEY.—Size, scale 1 to 10: 1, very small; 10, very large. Form: ov, oval; r, round. Color: r, red; y, violet; Y, yellow. Quality, scale 1 to 10: 1, very poor; 10, best. Season: a, autumn. Use: d, dessert. Abbreviation of name of place of origin: Am., America.]

Name.	Description.							Districts and starring.																		
	Size.	Form.	Color.	Quality.	Season.	Use.	Origin.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Acid.....	10	ov	ry	5-6	a	p	Am.																			
Dwarf.....	3-4	r		7-8	a	p	Am.																			
Purple.....	8-9	ov	ry	10	a	p	Am.					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Sweet.....	8-9	r	r	10	a	p	Am.					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Violet.....	10	r	y	10	a	p	Am.					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

Division III.—NATIVE AND INTRODUCED FRUITS AND NUTS GROWN IN THE OPEN AIR.

This division includes such species of native and introduced fruits and nuts grown under cultivation in the open air in the United States and Canada as are not included in Divisions I and II.

Section 1.—FRUITS.

Botanical name.	Common name.	Origin.	Districts and starring.																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Achras Sapota</i> , Linn.....	Sapodilla.....	West Indies						fs													
<i>Adansonia digitata</i> , Linn.....	Baobab, Monkey Bread, Sour Bread.	Africa						fs													
<i>Aegle marmelos</i> , Correa.....	Bengal Quince.....	India						fs													
<i>Akebia quinata</i> , Decaisne.....	Western Dwarf Juneberry.....	Japan		†																	
<i>Amelanchier alnifolia</i> , Nutt.....	Dwarf Juneberry.....	Native												*							*
<i>Borhyaphium</i> , D. C.....	Serviceberry, Shadberry, Juneberry.	Native			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Canadensis</i> , T. and G.....																					
<i>Anona cherimolla</i> , Mill.....	Cherimoya, Cherimolla, Jamaica Apple.	S. America																			*
<i>glabra</i> , Linn.....	Pond Apple.....	Florida																			
<i>muricata</i> , Linn.....	Soursop.....	West Indies																			
<i>reticulata</i> , Linn.....	Custard Apple, Bullock's Heart.	Trop. America																			
<i>squamosa</i> , Linn.....	Sugar Apple, Sweeteop.....	West Indies																			
<i>Anticarsia Buina</i> , Spreng.....		Malaysia						fs													*
<i>Arbutus unedo</i> , Linn.....	Strawberry Tree.....	Europe						fs													
<i>Arctocarpus incies</i> , Linn.....	Breadfruit.....	Polynesia						fs													
<i>Asiagrifolia</i> , Linn.....	Jackfruit, Jaca.....	India																			
<i>Asimina grandiflora</i> , Dunal.....	Papaw.....	Native																			
<i>triloba</i> , Dunal.....	Papaw, Pawpaw.....	Native			*	*	*														
<i>Atalantia trimera</i> , Oliv.....	Lioberry.....	East India																			
<i>Averrhoa Billmibi</i> , Linn.....	Bilimbi.....	Ind. India						fs													
<i>Carambola</i> , Linn.....	Carambola.....	India						fs													*
<i>Berberis Aquifolium</i> , Pursh.....																					*
<i>trifoliolata</i> , Moric.....		Native																			*
<i>vulgaris</i> , Linn.....	Aljaria.....	Texas																			*
<i>Barberry</i> , Berberry.....	Barberry, Berberry.....	Europe	**	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Blighia Sapida</i> , Kon.....	Akee.....	West Indies																			*
<i>Carica Papaya</i> , Linn.....	Papaw, Melon Papaw.....	Trop. America																			*
<i>Carissa Arduina</i> , Lam.....	Amatungula.....	Africa																			*
<i>Caradania</i> , Linn.....	Caradania, Christ Thorn.....	India																			*
<i>Casimiroa edulis</i> , Le Clare.....	White Sapota, Zapote Blanco.....	Mexico																			*
<i>Ceratonia Siliqua</i> , Linn.....	Carob, Karoub, Algaroba, St. John's Bread.	Asia, Africa																			*
<i>Cereus triangularis</i> , Mill.....	Strawberry Pear.....	Trop. America																			*
<i>Chrysobalanus Icaco</i> , Linn.....	Cocosa Plum.....	Florida																			*

Section 1.—FRUITS—Continued.

Botanical name.	Common name.	Origin.	Districts and starring.																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Chrysophyllum Calabito</i> , Linn.	Star Apple	West Indies																			
<i>Citrus bergamium</i> , Risso	Bergamot Orange	Asia																			
<i>Trifoliata</i> , Linn.	Trifoliolate Orange, Hardy Orange.	Japan	*	*		†	*		**	—		*	*								
<i>Coccoloba uvifera</i> , Linn.	Sea Grape, Shore Grape.	Europe, Asia																			
<i>Cornus Mas</i> , Linn.	Cornelian Cherry	Europe, Asia	*	*		*	*		*	*											
<i>Crataegus coccinea</i> , Linn.	Haw, Thornapple	Native	**			*	*		*	*											
var. <i>mollis</i> , T. and G.		Texas				*	*		*	*											
<i>Cydonia sinensis</i> , Thoutin	Chinese Quince	China				*	*		*	*											
<i>Cydonia mandchurica</i> , Sendt	Tree Tomato	Trop. America				*	*		*	*											
<i>Diospyros texana</i> , Scheele	Black Persimmon	Native	*	*		*	*		*	*											
<i>virginiana</i> , Linn.	Persimmon	Native	*	*		*	*		*	*											
<i>Elaeagnus multiflora</i> , Thunb	Goumi	Japan	*	*		*	*		*	*											
umbellata, Thunb.		Asia				*	*		*	*											
<i>Eriobotrya japonica</i> , Lindl.	Loquat, Japanese Medlar	Japan				*	*		*	*											
<i>Erythraea edulis</i> , S. Watson	Brazil Cherry	Guad. Island				Is	Is		Is	Is											
<i>Eugenia brasiliensis</i> , Lam	Rose Apple	S. America				*	*		*	*											
<i>jambos</i> , Linn.	Surinam Cherry	S. America				*	*		*	*											
<i>uniflora</i> , Linn.	Elephant Apple	E. India				*	*		*	*											
<i>Feronia elephantum</i> , Corr	Cluster Fig	India				Is	Is		Is	Is											
<i>Ficus glomerata</i> , Roxb.	California Strawberry	California				Is	Is		Is	Is											
<i>Fragaria californica</i> , Cham. and Sch.	Chile Strawberry	S. America	†	†		†	†		†	†											
<i>chiloensis</i> , Duchesne	Green Strawberry, Hill Strawberry.	Europe																			
<i>collina</i> , Ehr		Europe				*	*		*	*											
<i>clatior</i> , Ehr	Hantbol Strawberry	Europe	*	*		*	*		*	*											
<i>vesca</i> , Linn	English Wild Strawberry.	Europe, native (!)	*	*		*	*		*	*											
<i>virginiana</i> , Duchesne	Alpine.	Native				*	*		*	*											
<i>virginiana</i> var. <i>illinoensis</i> , Gray	Wild Strawberry	Native	*	*		*	*		*	*											
<i>Garcinia mangostana</i> , Linn	Western Wild Strawberry	Java				*	*		*	*											
<i>Glycosm's citrifolia</i> , Lindl	Mangosteen	China.				*	*		*	*											
<i>Garcia pinnata</i> , Roxb		E. India				*	*		*	*											
<i>Hibiscus sabbardilla</i> , Linn	Jamaica Sorrel, Rosella	E. India				*	*		*	*											
<i>Hovenia dulcis</i> , Thunb		Japan				†	†		*	*											
<i>Lucuma mammosa</i> , Gaert	Mamee Sapota					*	*		*	*											
<i>Pithecia</i> var. <i>angustifolia</i> , Gaert	Egg Fruit, Tessa, Canistel.					*	*		*	*											
<i>Mamea americana</i> , Linn.	Mamee Apple	Jamaica				*	*		*	*											
<i>Mangifera indica</i> , Linn.	Mango	India				*	*		*	*											
<i>Melicocca bijuga</i> , Linn	Ginep, Spanish Lime	Trop. America				*	*		*	*											
<i>Melicocca bijuga</i> , Linn	Ceriman	Mexico				*	*		*	*											
<i>Monstera deliciosa</i> , Liebm	Mexican Mulberry	Texas				*	*		*	*											
<i>Morus celtidifolia</i> , H. B. and K	Japanese Mulberry	Japan				*	*		*	*											
<i>japonica</i> , And	Black Mulberry	Asia.	—			*	*		*	*											
<i>nigra</i> , Linn						*	*		*	*											

Plant Name	Origin	Climate	Soil	Exposure	Height	Flower	Fruit	Uses
<i>Musa chinensis</i> Sweet, syn. <i>M. Cavendishii</i> Lamb.	Dwarf Banana, Chinese Banana.	China.						
<i>corniculata</i> , Lour.	Labang.	Ind. India.						
<i>paradisaca</i> , Linn.	Pantain.	India.						
<i>sapientum</i> , Linn.	Banana, Horse Banana.	India.						
<i>Myrica</i> Nagi Thunb. syn. <i>M. rubra</i> , Sieb. and Zucc.		Asia.						
<i>Nephelium lit-chi</i> , Cambess.	Litchi, Lee Chee.	China.						
<i>Natalia cerasiformis</i> , T. and G.	Oeo Berry.	California.						
<i>Opuntia ficus-indica</i> , Mill.	Indian Fig.	Trop. America.						
<i>Tuna</i> , Miller.	Prickly Pear.	W. Indies.						
<i>vulgaris</i> , Miller.	Prickly Pear.	Native.						
<i>Passiflora edulis</i> , Sims.	Granadilla.	S. America.						
<i>incarnata</i> , Linn.	May Apple, May pop.	Native.						
<i>laurifolia</i> , Linn.	Water Lemon.	W. Indies.						
<i>ligularis</i> , Juss.		Trop. America.						
<i>maliformis</i> , Linn.	Sweet Cup, Calabash.	W. Indies.						
<i>quadrangulata</i> , Linn.	Granadilla.	Brazil.						
<i>Pereskia aculeata</i> , Miller.	Barbados Gooseberry.	W. Indies.						
<i>Persea gratissima</i> , Gaert.	Agavate, Avocado, Alligator Pear.	Mexico.						
<i>Phoenix dactylifera</i> , Linn.	Date Palm.	Africa.						
<i>Phyllanthus distichus</i> , Muell.	Otakeite Gooseberry.	Ind. India.						
<i>emblica</i> , Linn.	Myrobolan.	E. Indies.						
<i>Physalis Alkekengi</i> , Linn.	Strawberry Tomato, Winter Cherry.	Persia.						
<i>peruviana</i> , Linn.	Cane Gooseberry.	S. America.						
<i>Prunus Beccayi</i> , Bailey.	Western Dwarf Cherry.	Native.						
<i>Capulin</i> , Zucc.	Capulin, Cupulino.	Mexico.						
<i>dasyarpa</i> , Ehr.	Purple Apricot, Black Apricot.	Asia.						
<i>demissa</i> , Walp.	California Wild Cherry.	California.						
<i>emarginata</i> , Walp.	Loley.	California.						
<i>ilicifolia</i> , Walp.	Malab. Cherry.	Cal.						
<i>Mahaleb</i> , Linn.	Beach Plum.	Eur., Asia.						
<i>Martima</i> , Wang.	Chinese, or Japanese Apricot.	Native.						
<i>Mume</i> , Lieb. and Zucc.	Pink Cherry, Bird Cherry.	Native.						
<i>pennsylvanica</i> , Linn.	European Bird Cherry.	Europe.						
<i>padia</i> , Linn.	Wild Plum of California.	Japan.						
<i>paniculata</i> , Thunb.	Choke Cherry.	China.						
<i>subcordata</i> , Benth.	Sand Plum.	Native.						
<i>tomentosa</i> , Thunb.	Southern Crabapple.	Native.						
<i>virginiana</i> , Linn.	Native Crabapple.	Native.						
<i>Watsoni</i> , Sargent.	Medlar.	Eur., Asia.						
<i>Pyrus angustifolia</i> , Ait.	Prairie Crab.	Native.						
<i>coronaria</i> , Linn.	Japanese Quince.	Japan.						
<i>germanica</i> , J. Hooker.	Oregon Crab.	Native.						
<i>icenis</i> , Bailey.		Asia.						
<i>japonica</i> , Thunb.		Japan.						
<i>rivularis</i> , Dougl.		Native.						
<i>salicifolia</i> , Linn.		Asia.						
<i>sieboldi</i> , Regel.		Japan.						

Section 1.—FRUITS—Continued.

Botanical name.	Common name.	Origin.	Districts and starting.																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Pyrus Sorbus</i> , Gaert.	Service Tree	Eur., Afr.		*																	
<i>Rhodomyrtus tomentosa</i> , Wight	Downy Myrtle	China.																			
<i>Ribes cynosbati</i> , Linn.		Native.	*	*						*	*										
<i>Ribes americanum</i> , Mill.	Native Black Currant	Native.	*	*						*	*										
<i>Rubus crataegifolius</i> , Bunge	Siberian Raspberry	Asia.																*			
<i>Rubus cuneifolius</i> , Pursh	Sand Blackberry			†																	
<i>Rubus cuneifolius</i> , Torr.		Native.																*			
<i>Rubus ellipticus</i> , Smith	Raspberry	India								*	*										
<i>Rubus inivius</i> , Bailey	Dewberry	Native.								*	*										
<i>Rubus microphyllus</i> , Linn., syn. <i>R. palmatus</i> , Thunb.		Japan																*			
<i>Natkanus, Mocho</i>	Cloudberry.	Native	*	*																	
<i>phenicolasius</i> , Maxim.	Japanese Raspberry, Wine-berry.	Japan								—								*			
<i>roseifolius</i> , Sm., Syn. <i>R. sorbyfolius</i>	Strawberry Raspberry	Asia		†																	
<i>trivialis</i> , Mich.	Southern Dewberry	Native.		*				**			**										
<i>vitifolius</i> , Cham. and Schlecht	Western Dewberry	Native.		*				*			*							*			
<i>Sambucus canadensis</i> , Linn.	Elderberry	Native.	*	*				*		*	*										
<i>Shepherdia argentea</i> , Nutt.	Buffalo Berry	Native.	**	*				*		*	*							*		*	*
<i>Solanum muricatum</i> , Ait.	Pepino	S. America.		*				*		*	*										
<i>Tamarindus indica</i> , Linn.	Tamarind.	Africa		*				*		*	*										
<i>Triphasia Aurantiola</i> , Lour.	Limeberry.	China.	*	*				*		*	*										
<i>Vaccinium corymbosum</i> , Linn.	Swamp Blueberry, Highbush	Native.	*	*				*		*	*										
	Huckleberry.																				
<i>macrocarpon</i> , Ait.	American Cranberry	Native.	*	*				*		*	*										
<i>pennsylvanicum</i> , Lam	Blueberry	Native.	**	*				*		*	*										
<i>Vangueria madagascariensis</i> , J. F. Gmel.	Voavanga	Madagascar	*	*				*		*	*										
<i>Viburnum Opulus</i> , Linn	Highbush Cranberry	Native.	**	*				*		*	*										
<i>Vitis arizonica</i> , Engelm		Arizona																	*	*	*
<i>Berlandieri</i> , Planch.		Texas									*								*	*	*
<i>californica</i> , Benth.		California									*								*	*	*
<i>candicans</i> , Engelm.	Mustang Grape of Texas	Texas									*								*	*	*
<i>cinerea</i> , Engelm.	Sweet Winter Grape	Native.		*				*		*	*								*	*	*
<i>cordifolia</i> , Lam.	Winter Grape, Frost Grape	Native.		*				*		*	*								*	*	*
<i>Champini</i> , Planch		Texas								*	*								*	*	*
<i>Doaniana</i> , Muns	Doan's Grape	Native.	—	*				—		*	*								*	*	*
<i>monticola</i> , Buck	Sweet Mountain Grape	Texas								*	*								*	*	*
<i>rupestris</i> , Scheele		Native.								*	*								*	*	*
<i>Ximenia americana</i> , Linn.	"Alvarillo del Campo"	Native.								*	*								*	*	*
<i>Zizyphus jujuba</i> , Lamarck	Jujube	Mexico								*	*								*	*	*
<i>Zizyphus</i> , Gaert.	Jujube of Southern Eur.	India		*				*		*	*		*	*	*	*	*	*	*	*	*
		Asia.								*	*		*	*	*	*	*	*	*	*	*

SECTION 2.—NUTS.

Botanical name.	Common name.	Origin.	Districts and starring.																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Aleurites triloba</i> , Forst.	Candlenut.	Asia.																			*
<i>Anacardium occidentale</i> , Linn.	Cashew Nut.	India.																			*
<i>Castanea nana</i> , Muhl.	Dwarf Chinquapin.	Native.			*	*	*	*	*	*											*
<i>Castanea pumila</i> , Mill.	Chinquapin, Chinkapin, Chincapin.	Native.			*	*	*	*	*	*											*
<i>Calodendrum capensis</i> , Thunb.	Cape Chestnut.	S. Africa.																			†
<i>Castanopsis chrysophylla</i> , A. De C.	Western Chinkapin.	Native.																*	*	*	*
<i>Castanospermum australe</i> , Cunn.	Moreton Bay Chestnut.	Australia.																			*
<i>Cocos nucifera</i> , Linn.	Cocoanut.	E. Indies.																			*
<i>Cola acuminata</i> , Schott and Endlich	Kola, Bissu, Goora.	Africa.																			*
<i>Corylus americana</i> , Walt.	American Hazel.	Native.	**	*	*	*	*	*	*	*											*
<i>Corylus californica</i> , Rose.	California Hazel.	Native.		*	*	*	*	*	*	*											*
<i>rostrata</i> , Ait.	Beaked Hazel.	Native.	*	*	*	*	*	*	*	*											*
<i>Gevuina avellana</i> , Molina.	Chilean Nut.	Chile.		*	*	*	*	*	*	*											*
<i>Ginkgo biloba</i> , Linn.	Ginkgo, Maidenhair Tree, Fa-koo.	Asia.		*	*	*	*	*	*	*											*
<i>Hicoria glabra</i> , Britt.	Pignut.	Native.	*	*	*	*	*	*	*	*											†
<i>laciniosa</i> , Sarg.	Shellbark, Big Shellbark.	Native.	*	*	*	*	*	*	*	*											†
<i>ovata</i> , Britt.	Shagbark, Little Shellbark.	Native.	**	*	*	*	*	*	*	*											*
<i>Jubaea spectabilis</i> , Humb.	Coquito, Small Cocoanut.	Chile.																			*
<i>Juglans californica</i> , Wats.	California Black Walnut.	California.																*	*	*	*
<i>cinerea</i> , Linn.	Butternut, White Walnut, Olnut.	Native.	**	*	*	*	*	*	*	*											*
<i>cordifolia</i> , Maxim.	Japanese Walnut.	Japan.		†	*	*	*	*	*	*											*
<i>mandshurica</i> , Maxim.	Japanese Walnut.	Asia.		†	*	*	*	*	*	*								*	*	*	*
<i>nigra</i> , Linn.	Black Walnut.	Native.	**	*	*	*	*	*	*	*											*
<i>rupestris</i> .	Mexican Walnut.	Mexico.			*	*	*	*	*	*											*
<i>Sieboldiana</i> , Maxim.	Japanese Walnut.	Japan.			*	*	*	*	*	*									*	*	*
<i>Macadamia ternifolia</i> , F. V. Muell.	Queensland Nut.	Australia.	†					*											*	*	*
<i>Platanus</i> , Linn.	Turpentine Tree.	Europe, Afr., Asia.																†	†	†	†
<i>Platanus</i> , Linn.	Platanus.	Syria.																			†
<i>Sapium sebiferum</i> , Roxb.	Tallow Nut.	China.						†	†	†											†
<i>Terminalia catappa</i> , Linn.	Tropical Almond.	E. Indies.						*													†
<i>Torreya nucifera</i> , Liebh. and Zucco	Torreya.	Japan.																			†

THE SOCIETY'S RULES FOR EXHIBITING AND NAMING FRUITS.

The rules of the American Pomological Society for exhibiting and naming fruits are as follows:

SECTION I.**NAMING AND DESCRIBING NEW FRUITS.**

Rule 1.—The originator or introducer (in the order named) has the prior right to bestow a name upon a new or unnamed fruit.

Rule 2.—The society reserves the right, in case of long, inappropriate, or otherwise objectionable names, to shorten, modify, or wholly change the same, when they shall occur in its discussions or reports; and also to recommend such changes for general adoption.

Rule 3.—The name of a fruit should preferably express, as far as practicable by a single word, a characteristic of the variety, the name of the originator, or the place of its origin. Under no ordinary circumstances should more than a single word be employed.

Rule 4.—Should the question of priority arise between different names for the same variety of fruit, other circumstances being equal, the name first publicly bestowed will be given precedence.

Rule 5.—To entitle a new fruit to the award or commendation of the society it must possess (at least for the locality for which it is recommended) some valuable or desirable quality, or combination of qualities, in a higher degree than any previously known variety of its class and season.

Rule 6.—A variety of fruit having been once exhibited, examined, and reported upon as a new fruit by a committee of the society will not thereafter be recognized as such, so far as subsequent reports are concerned.

SECTION II.**COMPETITIVE EXHIBITS OF FRUITS.**

Rule 1.—A plate of fruit must contain six specimens; no more, no less, except in the case of single varieties not included in collections.

Rule 2.—To insure examination by the proper committees all fruits must be correctly and distinctly labeled and placed upon the tables during the first day of the exhibition.

Rule 3.—The duplication of varieties in a collection will not be permitted.

Rule 4.—In all cases of fruits intended to be examined and reported by committees the name of the exhibitor, together with a complete list of the varieties exhibited by him, must be delivered to the secretary of the society on or before the first day of the exhibition.

Rule 5.—The exhibitor will receive from the secretary an entry card, which must be placed with the exhibit, when arranged for exhibition, for the guidance of committees.

Rule 6.—All articles placed upon the tables for exhibition must remain in charge of the society till the close of the exhibition, to be removed sooner only upon express permission of the person or persons in charge.

Rule 7.—Fruits or other articles intended for testing, or to be given away to visitors, spectators, or others, will be assigned a separate hall, room, or tent, in which they may be dispensed, at the pleasure of the exhibitor, who will not, however, be permitted to sell and deliver articles therein, nor to call attention to them in a boisterous or disorderly manner.

SECTION III.

COMMITTEE ON NOMENCLATURE.

Rule 1.—It shall be the duty of the president, at the first session of the society, on the first day of an exhibition of fruits, to appoint a committee of five expert pomologists whose duty it shall be to supervise the nomenclature of the fruits on exhibition, and in case of error to correct the same.

Rule 2.—In making the necessary corrections they shall, for the convenience of the examining and awarding committees, do the same at as early a period as practicable, and in making such corrections they shall use cards readily distinguishable from those used as labels by exhibitors, appending a mark of doubtfulness in case of uncertainty.

SECTION IV.

EXAMINING AND AWARDING COMMITTEES.

Rule 1.—In estimating the comparative values of collections of fruits committees are instructed to base such estimates strictly upon the varieties in such collections which shall have been correctly named by the exhibitor prior to action thereon by the committee on nomenclature.

Rule 2.—In instituting such comparison of values committees are instructed to consider: First, the values of the varieties for the purposes to which they may be adapted; second, the color, size, and evenness of the specimens; third, their freedom from the marks of insects, and other blemishes; fourth, the apparent carefulness in handling, and the taste displayed in the arrangement of the exhibit.



BULLETIN No. 9.

U. S.-DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY.

GUSTAVUS B. BRACKETT, POMOLOGIST.

THE FIG:

ITS HISTORY, CULTURE, AND CURING

WITH

A DESCRIPTIVE CATALOGUE OF THE KNOWN VARIETIES OF FIGS.

BY

GUSTAV EISEN, Ph. D.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,
Washington, D. C., June 14, 1901.

SIR: I have the honor to transmit herewith, and to recommend for publication as a bulletin of this division, the manuscript of an article on The Fig: Its History, Culture, and Curing, with a descriptive catalogue of the known varieties of figs, prepared by Dr. Gustav Eisen, of San Francisco, Cal.

Dr. Eisen is too well known as an author of high standing to need any introduction to the horticultural world. His name carries with it a guaranty of the value of this, his latest work.

The recent successful introduction of the blastophaga into the fig-growing sections of the United States by the Department of Agriculture almost certainly assures the production of first-class Smyrna figs, which will doubtless greatly encourage and stimulate the industry, and thereby create an increase in the demand for reliable literature on the subject.

This comprehensive treatise contains information of value to the scientific and practical fruit grower never before published in the form in which it is here presented.

Very respectfully,

G. B. BRACKETT,
Pomologist.

Hon. JAMES WILSON,
Secretary.

PREFACE.

The earliest observations on which this bulletin is based were begun many years ago, during the author's visit to the fig districts of the Mediterranean countries. Later on investigations were made in Mexico, Central America, and California, principally in the latter.

My researches have been greatly aided by many friends and sympathizers. Among the officials of the United States Department of Agriculture I have received much help and encouragement from Dr. L. O. Howard, Chief of the Division of Entomology, while Col. Gustavus B. Brackets and Mr. William A. Taylor, the former, Chief and the latter Assistant Pomologist, have assisted me in every possible manner at much sacrifice of their own valuable time. Mr. E. A. Schwarz, of the Division of Entomology, has given me much information about the *Blastophaga*, and helped me in regard to the literature, from which he has made extracts for my use. Mr. Newton B. Pierce, of the Division of Vegetable Physiology and Pathology, has contributed two photographs taken by him in Sicily. The Paddock & Fowler Company, of New York, has kindly given me for publication a number of photographs illustrating the packing of figs, etc., taken by them for special use in this bulletin. From foreign scientists I have received aid from Graf Solms-Laubach, of Germany, and from Dr. Paul Mayer, of Naples, both having sent me rare and valuable caprifigs for trial in this country. In California I have repeatedly had assistance from Mr. E. W. Maslin, Mr. Felix Gillet, Mr. George O. Mitchell, Mr. John C. Jones, Mr. G. P. Rixford, and Dr. W. J. V. Osterhout. I am especially indebted to Mr. John Rock, of Niles, without whose assistance this bulletin could never have been published in its present form. Besides his own collection of figs he has also cared for that imported by the United States Government from the Royal Horticultural Society of London, both collections having been at my disposal for experiment and study. Dr. Peder S. Bruguere, of San Francisco, has taken for my use a number of photographs illustrating figs and fig trees, some of which are used in this memoir. To these gentlemen, as well as to all others who have aided me in my work, I wish here to express my gratitude.

GUSTAV EISEN.

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THE FIG: ITS HISTORY, CULTURE, AND CURING.

CHAPTER I.

INTRODUCTORY.

NAME AND DERIVATION.

The English word "fig" is of very ancient origin, and is derived from the Latin "ficus" and the yet older Hebrew name "feg." The English word must have originated during the Roman invasion of England, when probably the first fig trees were planted in English soil. As early as 1250 the word was in general use in a commercial sense, as "figges" or "fegges" constituted one of the products regularly imported into England, especially from Portugal and Spain.

The wild fig, the ancestor of the edible fig race, is unknown in English-speaking countries, except, of course, where found as botanical specimens. In the semitropical Mediterranean districts this wild fig is met everywhere except in the north of Italy and the Riviera and in the south of France. In Italy the wild fig is known as the "profico," "fico selvaggio," or "caprificus," the last name being derived from *capra* (goat) and *ficus* (fig), and indicating the worthlessness of the fruit for eating purposes. From "caprificus" is derived our name "caprifig" and the French "caprifiguier." In Spain it is known, in some districts, at least, as the "caprahigo." In Greece it is called "erineos," while the edible fig is there known as "sycon" (*συκον*). In Hebrew the edible fig was "tëena," in Aramaic "tênâ," and in Arabic it is "tin." It may not be out of place also to note that the name of another celebrated fig variety, the "Sycamore," of Egypt, is derived from the Greek "sycon" (fig) and "moro" (mulberry), meaning mulberry fig, on account of the peculiar arrangement of the fruit. What we in the United States incorrectly call "sycamore" is really not a sycamore, but a plane tree.

The various crops of the fig, as well as of the caprifig, are also given different names in different countries. In these pages reference is made to the wild fig as "caprifig," meaning thereby only the male tree of *Ficus carica* L., while the word fig will always refer to the edible fig, or the cultivated race of the same species.

HOME AND DISTRIBUTION OF THE FIG INDUSTRY.

The probable home of the edible fig¹ is in the fertile part of southern Arabia, where at present the caprifig is wild, and where there are no traditions of its introduction. From south Arabia the Bahrâ tribe² is said to have brought the fig to ancient Idumaea and to Coelesyria,³ whence it was carried by other tribes and races to Syria and the Mediterranean shores. The march of the fig was slow and undoubtedly required many centuries to reach the shores of the Mediterranean coast. Once there, the facilities for transportation and the extensive trade and voyages of the maritime nations greatly facilitated its further distribution.

But while it is probable that the home of the edible fig is to be found in Arabia Felix, it is even more likely that the home of the fig industry is to be looked for elsewhere. Nearly all the southern cultivated fruits which we now possess appear to have originated somewhere in western Asia. Almonds, nuts, apricots, peaches, olives, Asiatic grapes, dates, figs, prunes, etc., all seem to have been brought to great perfection in a country somewhere in Asia, but now unknown to us. The bringing to great perfection of so many varieties of fruit indicates a very high state of civilization of very old date, compared to which the Republics of Greece and Rome must be considered modern. Through the very latest archæological discoveries we now know that such a civilization existed as far back as ten thousand years ago in western Asia, in the valleys of the Euphrates and Tigris. Nowhere else have archæologists been able to trace such an ancient and remarkable civilization; and, as the origin of so many of our best fruits, vegetables, cereals, and domestic animals point to a west-Asiatic origin, it is not too much to presume that in the most ancient civilization of Nippur dwelt the originators of nearly all those economic vegetables, as well as animal products, on which man, in all temperate regions, is now dependent for his sustenance.

From the motherland, Asia, the fig was carried over the Western World by two different peoples and by two distinct routes. These two peoples, in ancient times the great colonizers of the world, were the Phœnicians and the Greeks, and to both of these may be traced the spreading of the culture of the fig. The older colonizer of the two was the Phœnician. At the end of the fourteenth century⁴ before Christ these thrifty merchants had finished the colonization of the great islands of the Mediterranean, their colonies and trading posts being by that time securely planted on Cyprus, Rhodes, Sicily, Malta, and Corsica. The further course of their trading and colonization enterprise lay along the southern shores of the Mediterranean

¹ Solms-Laubach (2), pp. 77-78.

² Lagarde, 3 c., p. 383.

³ Ibid., p. 377.

⁴ Dunker, 74, c. v, p. 39.

over the coast of Africa, while on the opposite side of the great sea it stretched along the shores of France and Spain¹ and through the Pillars of Hercules, along the coast of Portugal, and as far north as to the Channel, with its islands and comparatively favorable climate. There can be no doubt that to all these places the fig tree was carried in many varieties at a very early date, even previous to the introduction of the fig into Greece and Italy proper.

The real history of the fig industry begins after the introduction of the fig into the Mediterranean region outside of Asia, and particularly into Greece. Historical references are few and far between. The tree and its fruit constituted at first merely a luxury for the rich. Later, mention of the fig becomes frequent, and not merely as a luxury during the ripening period, but as an important article of diet for the people during the winter months.

The time of the first introduction of the fig into Europe is very uncertain. In the Homeric songs, the oldest European literature extant, the fig is hardly mentioned. In the *Iliad*, describing the Trojan war, the greatest national undertaking of the Greeks, no reference to the fig is found. In the *Odyssey*, describing the wanderings of Odysseus after this war, the fig is mentioned three times. In the part descriptive of the agonies of Tantalus in the lower world we read how in vain he tried to reach the fruits almost within his grasp, "pomegranates, pears, apples, sweet figs, and dark olives."² The composition of the Homeric songs is generally conceded to have been accomplished before the ninth century before Christ, but later investigations make it probable that the verses mentioning the fig in the *Odyssey* are interpolations of much later date. Hesiod, who lived in the ninth century and after Homer, has nothing to say about the fig. The earliest mention of undoubted genuineness is by the poet Archilochus, who lived about seven hundred years before our era. He tells about the fig being cultivated on the Greek island of Paros, and there greatly contributing to the enjoyment of life. The introduction of the fig in Greece must, therefore, have occurred some time in the eighth century before Christ, and undoubtedly it then came from the Semitic nations across from Palestine and Asia Minor. Later on Attika and Sikyon, the latter place named after "syke" (fig), had become famous for their excellent figs, the origin of which was attributed to the goddess Ceres (Demeter), who caused the fig tree to spring up at Phykalos as a reward for the hospitality extended to her by the inhabitants of the place.

The cultivation of the fig soon extended all over Greece, and the fig gradually became an important article of diet of both poor and

¹ Moers, vol. II, 512, and Meltzer, I, p. 37. Gades, the present Cadiz, founded earlier than 1100 before Christ.

² *Od.*, η. 115, 116; λ. 589; η. 120-121; ω. 339-340; ω. 245.

rich. The Athenians were especially chided for their fondness for figs, and nicknamed "sykophants" (fig-eaters), a name afterwards applied with a different meaning to those spies who informed the authorities about the unlawful exportation of figs from Attika. So famous became the figs of that province that Xerxes, the King of the Persians, daily procured Attic figs for his table in order that they might constantly remind him of the desirability of adding to his domain a country which could produce such fine fruit.¹ From this time the fig is constantly referred to in the Greek literature, and Theophrastus, Aristotle, and other writers describe the caprification process, then extensively practiced.

From Greece the fig tree and its culture spread along the northern shores of the Mediterranean and the Adriatic until it gradually reached the southern parts of Italy. There it must have been established at an early date, as it figures in the earliest Roman mythology, the she-wolf having nursed the infants, Romulus and Remus, under the spreading crown of a certain fig tree, which was thought to be in existence and pointed out as a sacred object in the time of Pliny. Certain it is that from remotest times fig culture was a cherished pursuit among the Romans, who, through seedlings and culture, originated numerous varieties. So different and characteristic had these become in the time of Pliny (23-79 A. D.) that they excited the special attention of that great naturalist. He wrote: "We see from this how the universal law which preserves the types of the species may vary"—a most remarkable expression, which clearly foreshadows the modern theory of evolution.²

The many varieties described by the ancient writers, such as Theophrastus, Cato, and Pliny, can not now be identified with any certainty. Many of these varieties originated from seed, some accidentally, others as the result of efforts made for that purpose.³ Their identification has been attempted by several modern investigators, such as Porta, Gasparrini, and Gallesio, and while their efforts have been highly interesting, they have brought no conclusive results. When we consider how quickly varieties are discarded for others of greater value, it becomes probable that most of these ancient figs became extinct centuries ago. From the many varieties mentioned by the Greek and Latin authors⁴ we may, however, conclude that fig culture was extensively distributed and considered of great importance. But notwithstanding the many varieties, the best and choicest figs were those imported from Syria, as we are told that during the reign of the Emperor Tiberius (B. C. 42-A. D. 37)⁵ considerable trade existed in

¹ Willkomm, pp. 6, 9.

² Ibid., p. 7.

³ Varro. lib. 12, cap. xi, 5.

⁴ Theophrast, cap. III, 6; v., 2, 8; Cato, vol. 1, cap. 8, 1; Pliny, lib. xv, cap. 19.

⁵ Willkomm, p. 7.

Syrian figs, these figs being generally valued higher than those of Italy and other Mediterranean districts.

At the end of the Roman Empire, near the close of the fifth century A. D., the fig may be considered as distributed along the coast of the Atlantic as well as along the shores of the Mediterranean. Toward the south the coast of Africa abounded in fig trees, while on the other side fig culture stretched over the wild coast region of Portugal, France, the Channel islands, and perhaps over the southern part of England. But nowhere else had the cultivation and the drying of figs reached such a height of development as in Syria.

Nearly seventeen hundred years after the Phœnician colonization the Arabic conquest began to follow that same route. The Arabs in their turn carried with them the fig tree, now developed into many new varieties, and raised fig culture to a degree of importance which it has never since attained outside of its old home, Syria. The Arabic invasion extended through northern Africa to Spain and Portugal, and in these countries fig culture began to flourish and rapidly became of even greater importance than in Italy and Greece. The Arabs held the fig in the highest esteem and considered it superior to any other fruit. It is even related by Zamakhshari,¹ an Arabian commentator on the Koran, that Mohammed, the prophet, himself, in his enthusiastic enjoyment of the delicious figs, once exclaimed: "If I should wish a fruit brought to Paradise it would certainly be the fig." The Arabic invasion, during the medieval ages, has indelibly stamped its mark on fig culture in the territory it occupied, and to this day the varieties of figs grown there are to a great extent different from and superior to those grown in countries colonized by the Greeks and Romans. Thus Portugal, the most southern province of Greece outside of the Pillars of Hercules, became especially famous for its figs. Algarve, with an almost perfect climate, produced a most superior article of dried figs, the commerce in which became of the greatest importance. Algarve almost exclusively supplied western Europe with dried figs for over one thousand years, and until late in the present century Portuguese figs dominated the English markets. It is only comparatively of recent date that the Smyrna figs have supplanted all others in English and American markets. Even as regards names, Arabic fig culture has left its influence to this day in the various countries of the ancient Arabic caliphate. Thus in Portugal the caprifig. is known as "*fico de toca*," the Arabic name being "*tokkar*," while in Malta the name "*tokar*" is yet in use and almost unchanged.²

If we again turn to the extreme Orient we find that the fig tree traveled much more slowly toward the east than toward the west. In the time of Herodotus, when all Greece had for centuries enjoyed the

¹ O. Celsius, c. II, 371, according to Solms-Laubach. p. 82.

² Solms-Laubach. p. 83.

fig, and where it had long since become a necessity and an important article of diet, the fig tree and its culture had not yet reached Babylon, and neither Media nor Persia was acquainted with its use. According to Herodotus, Sandanis warned Kroisos not to make war with "barbarians who knew neither wine nor figs."¹ Still, wild varieties of figs, not very different from the caprifig, are found in Persia and India, from which another race of edible figs might have been originated by any intelligent agricultural race.²

Gradually the fig tree spread over Asia Minor and Syria to parts of Mesopotamia and Persia and to the several oases in the great Arabian desert. In the lowlands between the Euphrates and the Tigris fig culture was yet unknown.³ In the mountain districts of Taurus, Armenia, and in the Iranian table-lands fig culture long ago reached a high development. Toward the east it has spread to Khorassan, Herat, and Afghanistan, as well as to Meru and to Chiwi. But India did not possess fig culture in the fourteenth century, though native figs of good quality and resembling our edible fig are growing wild in the hills of the Punjab.³

The fig is supposed to have reached China during the reign of the Emperor Tschang-Kien, who fitted out an expedition to Turan in the year 127 A. D. The fig is first mentioned by Chinese writers in the eighth century. Hia-tscheng-Shi, in his work, "Yu-yang-tsa-tsu," treating of the Chinese trade, speaks of a fruit as "tin-tin" in a country—"Fo-tin" (Palestine). "Tin" is the Arabic name for the fig. This writer mentions that the fruit originated without a blossom, etc. This early introduction of the fig to China may, however, be only a myth. It seems that in the fourteenth century figs were growing in China, but it is not certain if these figs were identical with our own. In 1550, however, the fig is described by the celebrated Chinese writer, Le-Shi-tschen,⁴ as growing in Chinese gardens, and from that time we may conclude that fig culture was properly established in the extreme eastern part of Asia. Now many varieties of figs are cultivated in China, some being of very good quality. In Egypt fig culture never assumed any prominent place, undoubtedly on account of the climate, which permits no plants to grow without irrigation, which, if given in any excess, is especially injurious to the quality of the figs. In the old tombs at Benihassan may be seen a wall painting illustrative of a fig harvest, in which the fig tree is characteristically and unmistakably pictured.⁵ The hieroglyphical

¹ Herodot, I, cap. 71, according to Hehm.

² Solms-Laubach (2), p. 45. From the following pages are taken many of the remarks on the eastern geographical distribution of the fig.

³ Solms-Laubach (2), p. 80.

⁴ The Chinese history of the fig is according to letters and manuscripts of Dr. Bretschneider in Peking, to Solms-Laubach.

⁵ Unger, pp. 83, 110.

word for fig was "bak-ou," and Syria was often referred to as a country rich in wine, oil, and bak-ou.¹

With the discovery of the New World the edible fig obtained a foothold in all the countries visited by the Spanish and Portuguese missionaries. Figs of different and distinct species were found by them growing in the tropical parts of Mexico, Central America, and South America, but these native figs were inferior to those brought over the Atlantic. It is to these Spanish missionaries that we owe the introduction of figs into California, and the "Mission" black fig is yet the most important and most widely distributed variety in all American countries Christianized by missionaries from Spain. This "Mission" fig is extensively distributed over the northern parts of Mexico as well as over Baja and Alta California, Peru, and Chile, while a smaller and slightly different variety is found in the highlands of Mexico and Central America.

To the Southern States of the United States the fig was brought principally by the French in the earliest days of their occupation, while later many varieties were imported from English nurseries. Of late years California has been the great distributing point of fig trees, some enterprising growers having made many direct importations of varieties from the Mediterranean districts, and these varieties have since found their way to Florida and other States.

It is interesting to note that while California has progressed enormously in fig culture and now possesses over a hundred varieties of figs imported from various parts of the world, its neighboring States, Sonora and Baja California, which are so preeminently suited to fig culture, are yet ignorant of the existence of other figs than the "Mission."

BOTANY OF THE FIG.

"Genus," "species," and "variety" are words used frequently in these pages, and must be thoroughly understood by anyone who wishes to master the principles of horticulture. In order to properly name, know, and classify plants they have been primarily arranged and grouped together according to their relationships and similarity. Thus all roses, wild and cultivated, are grouped and called by a common name—*Rosa*. This, then, is a genus, and the word *Rosa* is called a genus name. Similarly all figs, wild and otherwise, which resemble one another in certain respects are grouped together under a general genus called *Ficus*. There are a great many different kinds, originally wild, of roses and figs. Each one of these is called a species and is given a separate name. Such as the dogrose is known as *Rosa canina* and the edible fig is known as *Ficus carica*. There are many different edible figs, and these are called varieties or forms.

¹Chabas. p. 105.

Those varieties which differ very much in more important points might also be classified as species.

Many genera which resemble each other in several important points are grouped in a large group called a "family." Thus the genus *Rosa*, together with other genera, are grouped in the general family *Rosaceæ*. The fig and mulberry are placed in the same family, to which is given the Latin name *Moreæ*.

STRUCTURE OF A COMMON FLOWER.

As repeated references are made to the various parts of a fig flower, a short description of the structure of a flower is given.

By a flower is designated that particular part of a plant which produces the pollen and the seed, and its various parts are especially adapted for both the production of pollen and seed as well as for the protection and benefit of the generative organs producing them. In order that seed may be generated the flower possesses two distinct parts, which have different functions in the process of generation. These

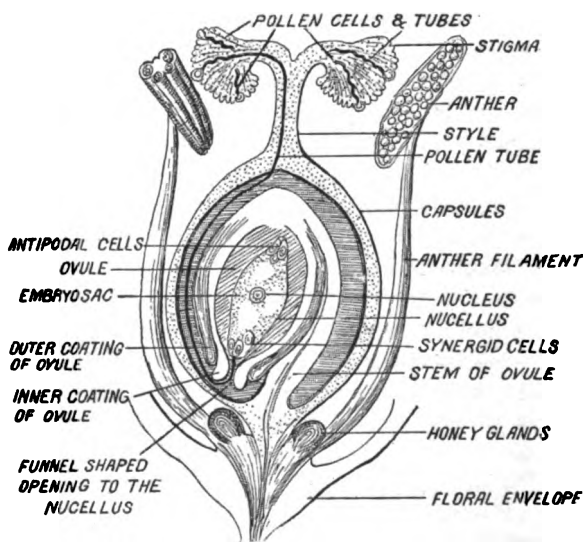


FIG. 1.—A diagrammatic representation of a common flower.

parts are known as male and female, and both of them must be present in order that seed may be produced.

These parts may either be found both in the same flower or one kind may be found in one flower, the other kind in another flower, or the two kinds may be found on two individual trees. In other words, we have flowers which contain both male and female organs, and we have flowers which are either male or female; or we have trees and plants of which different individuals carry either male or female flowers only. The female organ of a flower is called pistil; the male organ is known as stamen. The stamens are generally present in large number and situated in a ring around the ovary, which is found generally in the center of the flower. Surrounding both these organs are one or more rows of petals and sepals, known by a common name—perianth or floral envelope—but popularly though wrongly

called "leaves." This perianth serves as a protection to the seed and pollen producing parts, and when colored also serves to attract insects, without the aid of which comparatively few varieties of flowers would produce fertile seed.

The accompanying illustration (fig. 1) represents a flower which has been cut through lengthwise in order to show the generative organs, the petals having been left out. The cut does not represent any certain flower, but a flower in general.

The male organs are represented by two stamens. These consist of an upper button-like part, the anther, which produces the pollen, and a lower stock or outer filament, which supports the anther. The right-hand anther shows on its surface the pollen grains.

The female organ of the flower consists of an ovary and an upper part, the stigma, supported by a style. The ovary contains the ovules, each of which has two coats surrounding the central nucellus. This is the part which directly produces the future seed. The stigma is the uppermost part of the female organ. It is generally kept moist by a special gum-like fluid, which causes the grains to adhere to the stigma. The stem supporting the stigma is called the "style." Through the center of the style down to the funnel-shaped opening in the ovule there runs a hollow canal, which gives admission to the nucellus.

In order that a flower may produce seed it is necessary that the pollen tubes produced by the pollen should penetrate through the stigma and style into the ovary. This process is called fecundation. The pollen grain and the cell of the ovule unite, and from their union the seed and the new plant are formed.

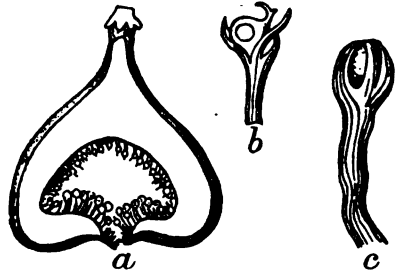


FIG. 2.—A seedling fig and fig flowers. *a*, The fig cut in half, showing the male flowers surrounding the eye-zone and the gall flowers at the bottom of the fig receptacle; *b*, a gall flower; *c*, a degenerate male flower. Grown by E. W. Maslin.

CHAPTER II.

FIG CULTURE IN VARIOUS FOREIGN COUNTRIES.

FIG CULTURE IN SMYRNA AND ASIA MINOR.

The best and most delicious figs when dried are those from Smyrna, known in the market as Smyrna figs. They derive their name from the seaport Smyrna, where they are packed and whence they are shipped to almost every country on the globe. The figs are, however, not grown in or very near to Smyrna, but in various places about 80 to 150 miles south and east from that town. Smyrna is to-day one of the most prosperous towns on the Mediterranean shore and one of the most important in Asia Minor. This prosperity is due to the trade in fruit, principally raisins and olives. The fig trade is smaller, but so excellent is the fruit that this product more than any other has made the port known all over the civilized world, and apparently the more so the farther we go west. In California, more than elsewhere, the name of Smyrna has become a household word to the horticulturists, who have been trying for years to produce figs equal to those shipped from Smyrna.

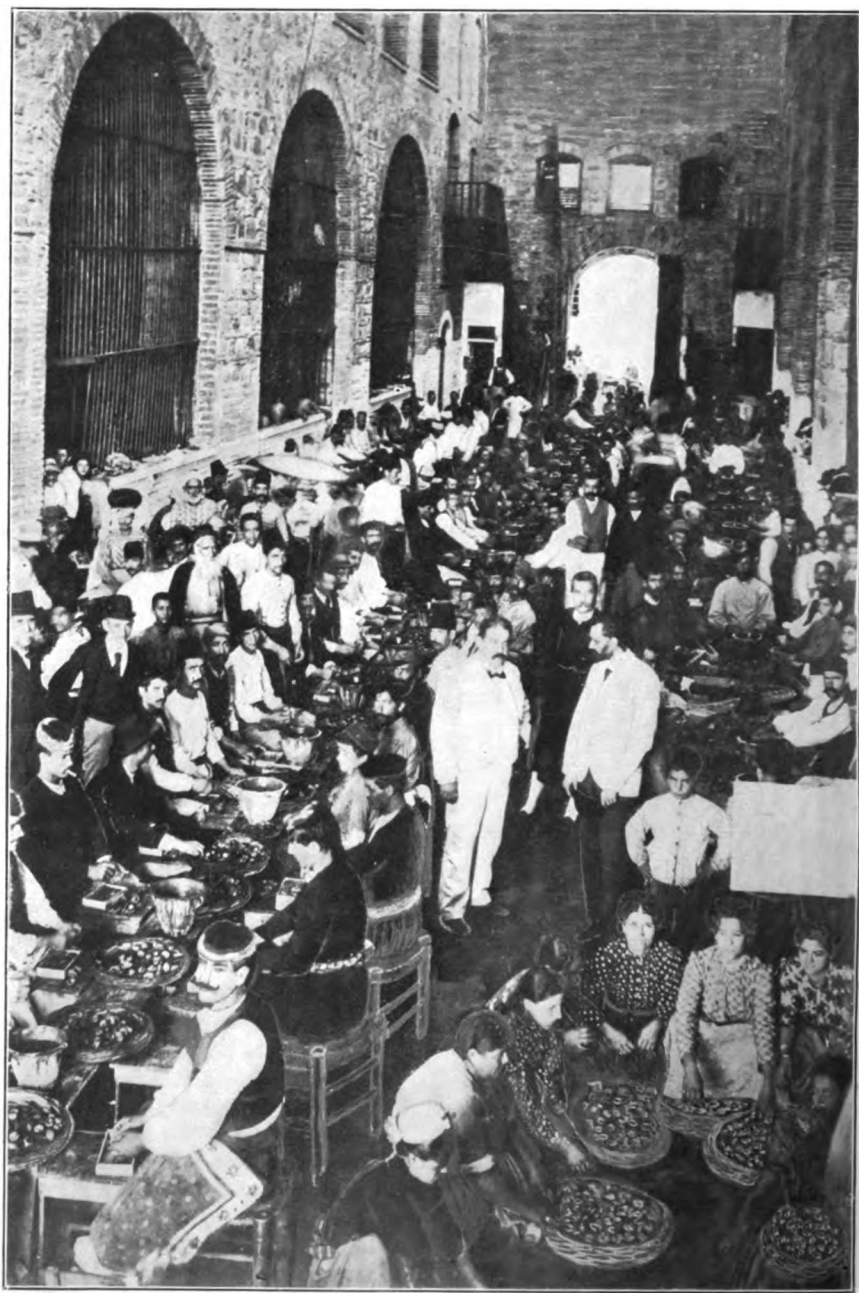
As is well known, Smyrna is situated in the western part of Asia Minor, and at the eastern end of the large and well-protected bay known as the Gulf of Smyrna. The latitude is 38° , corresponding approximately to that of San Francisco, but the climatic conditions of the places where the figs are grown correspond more properly to those of central and southern California, northern Sonora, southern Texas, etc.

In the most ancient times of which we have record a considerable fig trade existed in Smyrna, and we are told that in the time of the earlier emperors of Rome, in the first century of our era, dried figs of the best quality were brought from Smyrna to Rome. This fame for excellent figs was enjoyed by Smyrna all through the Middle Ages and down to our own times. At the time of Henry VIII and Elizabeth Smyrna figs reached England. It is, however, at a comparatively late date that the Smyrna fig trade reached the development it now possesses. The great competitors with Smyrna figs were those grown in Algarve in Portugal and for centuries known as Pharo figs. These were for a time the most common figs in the European market and were almost the only ones consumed. In the beginning of this century, however, the Portuguese or Pharo figs began to deteriorate, while at the same time, principally through Greek influences, a marked

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INTERIOR OF A SMYRNA PACKING ESTABLISHMENT.

Photograph by Paddock & Fowler Company.

improvement was noticed in the packing and curing of the Smyrna figs. To-day the Pharo figs are almost unknown, while the Smyrna figs have not only secured control of the former markets of the Pharo figs, but greatly extended them. (Pl. I.)

FIG DISTRICTS.

As already stated, while Smyrna is the export and packing place for the figs bearing that name, they are not grown in the immediate vicinity of the port, but are cultivated farther inland and to the south, in the valley of the Meander River. The river basin, which runs due east and west, lies about 80 miles south of Smyrna, from the vicinity of which it is separated by the Salatin Mountains—a rather high chain also running east and west. The principal fig district thus faces the south, being sheltered by the mountains from the north. The Meander Valley, situated principally on the north side of the river, is about 50 miles long by not over 5 miles wide, and generally less. But the fig district has of late extended even farther north, and the first orchards which are reached in going from Smyrna are situated on the north side of the Salatin Mountains, in the foothills of Ayasalouk, close to the ancient Ephesus. After the summit of the foothills has been reached at Azizieh, the road rapidly descends, and at Balachica the western point of the main fig district is reached. From here it extends about 50 miles due west into the interior. The most famous part, where the finest figs are grown, is the vicinity of Euovassi, at an elevation of 210 feet above the sea. Between Aidin (pronounced *I-deen*) and Nashi the land rises from 217 to 260 feet, and from there to the upper end of the valley there is a rise in all of 600 feet. The valley of the Meander, now traversed by a railroad, consists of a rather level plain, crossed by a number of gulches. The soil is very deep and rich, consisting of a vegetable loam, rich in mica and humus, possessing to a very high degree the quality of retaining moisture, so necessary to the well-being of the fig trees. No irrigation is resorted to or as a rule required.

According to the localities where grown, the Smyrna figs are divided into several different grades. Thus, proceeding from east to west on the Aidin railroad are found first the “Nazly figs.” These are grown between Ortoxi and Nazilli or Nasly. Those grown between Aidin and Erbegly are known as “Erbelli” figs, and those coming from points farther west from Dermendjik to Forbaly are known as “Forbaly.” Another smaller fig district, about 5 or 6 miles in diameter, is situated at Demieh, about 50 miles southeast of Smyrna, on the north side of the Salatin Mountains, in the valley of the river Kaistros.

CLIMATE AND SOIL.

The climate of the Aidin Valley differs somewhat from that of Smyrna, being warmer and drier. Thus, while Smyrna and its

vicinity are admirably suited for the growing and curing of raisin grapes, especially the Sultanas, Rosaki, and Black, the interior is less suited to them, but more to figs and oranges. The maximum heat in the summer seldom rises above 90° F. in the shade or 130° F. in the sun, and in the winter rarely falls below 30° F. There is considerable dew throughout the season, even in the summer, and the air is much more moist than in California and Arizona.

The winter is the rainy season, the summer the dry one, as on the Pacific coast. The rain falls from November to April, beginning and ending with scattering showers. The average rainfall is about 25 inches. From April to November practically no rain falls. While there is but little frost in the winter, there are sometimes frosts in March heavy enough to cause much injury to the young caprifig, the lobfigs not having set.

VARIETIES OF FIGS.

Regarding the names of the figs grown in the fig districts much confusion prevails, as the figs are known by the places where grown, or designated by color, shape, etc., or by quality, or style of packing. Thus "Leker ingir" means simply layer figs. The Turks, unable to pronounce "layer" properly, the name given by the English merchants, have corrupted it to "leker." Leker ingir is, therefore, not a variety, but a style of fig packing. "Hordas" are white figs of inferior quality which require no caprification. They are dried and shipped to Austria and Germany for adulterating coffee and for distilling. The white Hordas are used for the coffee, while the brown Hordas go to the distillery. "Budrun Hordas" is a variety which when dried is preferred by makers of adulterated coffee.

The following are some of the most generally cultivated figs in the Smyrna districts:

Lob Ingir (*lob meaning juicy, and ingir fig*).—This is the best fig for drying. The pulp is white; the form flat; the stalk short; the ribs prominent before maturity; the eye rather large, not open; skin whitish yellow; leaves deeply lobed, with the lobes long and narrow pointed. Of the five to seven lobes some are larger than others, making the leaf rather lopsided. Lob Ingir is undoubtedly identical with the variety known as "Bulletin No. 1,"¹ now grown in many places in California, where, however, it does not produce any crop without caprification or pollination, though now and then a fig of the first crop comes to partial maturity.

Ak Ingir (*ak, white; ingir, fig*).—Another fig for drying, possibly identical with "Bulletin No. 3." Fruit has not yet matured in California. Judging from unripe specimens, the fig is very round; the

¹ Varieties of figs introduced by the San Francisco Bulletin several years ago; hence the name.

eye prominent; the leaves almost entire, with very heavy white veins on the back.

Chil Ingir (*chil, smallpox; ingir, fig*).—This is a white fig of fine drying properties, covered, when fresh, with green spots as large as a dime or less. When drying, this fig becomes white and the green spots turn even whiter than the rest of the skin.

Hazir Lop (*hazir, ready; lop, to swallow or bite; also juicy*).—White; large; characterized by the stem remaining on the tree when the fig is pulled; very fine for eating fresh; not used for drying; requires caprification.

Sarilob Ingir (*sarilob, yellow; ingir, fig*).—This is another of the Smyrna figs. Perhaps it is identical with "Bulletin No. 2." In such case the fig is oblong, pyriform, broadest above the apex; the stalk is short; the skin yellow and slightly downy; the pulp pink; the leaves rather entire, with three shallow lobes; the eye large, protruding; requires caprification to mature fruit.

Bardakjik (*from bardak, an Egyptian pitcher*).—One of the very best drying figs. It is possible that this fig is among the "Bulletin" importations to California, but if so it has not yet been among those pollinated by the writer. This is a longer fig, having a white skin of extreme thinness, and an amber pulp. It dries well. It is often eaten fresh, and as such is considered the finest eating fig known.

The caprified fig, which is grown for caprification, and which also grows wild in the hills, is known as "ilek," and the process of caprification is known as "ilek atmak."

Other fruits which grow in the fig region are oranges, olives, and rosaki and black grapes. No wine is made in the fig region. Raisins are produced to a limited extent only. Apricots and peaches are grown in moderate quantity, but only for home use.

PLANTING LOBFIGS.

Before planting the ground is well and deeply plowed several times, fertilized with camel manure, and freed from weeds.

The planting is frequently done in a peculiar way not found in use outside of Smyrna. It is generally done in March. Of late the trees are grown about 60 feet apart in regular rows, though the older orchards were planted closer and more irregularly. The holes are dug of good depth, and for every hole two cuttings are used, which are set crossing each other. The butt ends are from 9 to 12 inches apart both below and above the soil, the cuttings thus crossing each other in the middle of the hole. The latter is filled up and stamped tight, leaving the cuttings protruding about 2 inches, which projecting part is again covered with loose soil, forming a small mound, in order to prevent drying out by wind and sun. During the first season hand watering is resorted to if the winter be a very dry one. After-

wards no irrigation is used or required. This peculiar way of planting, which has been considered an heirloom of ancient superstition, has been much condemned; but the custom is nevertheless a most excellent one, as it causes the fig tree to branch and spread in a number of fan-shaped branches, which prevents the very dangerous breaking of the limbs and branches of the trees. If we wish to prevent the breaking down of our own fig trees we must adopt this very method. Trees grown in this manner branch close to the soil and spread out in all directions, forming a number of trunks or stems. Only enough of the lower branches are cut away to allow passage for the pickers, and so low are the branches allowed to remain that the pickers must bend in order not to strike them, the lowest branches being 3 to 4 feet from the ground.

This planting also causes the trees to be more open to air and allows more sunshine in the interior of the crown. The advantage of this is evident when it is remembered that the best lobfigs are always found on the outside of the tree and never among the interior branches, where they are shaded and never come to proper maturity. The contrary is the case with the caprifigs, the best for caprification being found in the interior, among the denser foliage. The pruning of the fig is not extensively practiced in Smyrna. Trees planted as just described produce no main standard or central trunk which later needs to be cut out, but only several branches, which bend away from one another in a goblet-shaped manner. The necessary pruning is therefore confined to the cutting away of limbs that cross one another, and also to the cutting away of some of the year's growth from where it starts out from 3 or 4 year old wood. Limbs are never cut square off.

An important part of fig cultivation in Smyrna is the watching of the orchards. This is done by special guardians or watchers, known as "beckji." They stay in the orchards day and night, in specially prepared arbors or camps under some large tree near the drying ground, and their business is to keep away all intruders—thieves of humankind as well as beasts and birds.

The bearing quality of the fig depends greatly on the age of the fig trees. Younger trees will produce 50 pounds of dried fruit, trees in good condition bearing 150 pounds, while old trees will yield 300 or more pounds of dried fruit. No fig tree of the drying kinds is supposed to produce figs suitable for drying until it is four or more years old.

CAPRIFICATION.

Caprification, or "ilek atmak," is practiced yearly, as without it the crop will fail to set and mature. The time for this operation is in the last week of June. The figs have then reached the size of a hazelnut or larger. Four or six caprifigs are strung on a reed, and this is thrown over the branches of the edible fig trees. Later, as

more figs appear on the edible fig trees, the process is repeated, as the issuing of the wasps will cease in a few days. To a small tree only a few strings are required, while for a larger tree about 30 strings are needed to insure pollination. In case the caprifig crop fails, boat loads of caprifigs are imported from the Grecian islands at a great expense. In great scarcity the caprifigs sell at from $2\frac{1}{2}$ to 4 cents apiece, which

shows the value placed on them by the cultivator.

HARVEST AND DRYING.

Before the figs begin to ripen the ground under the trees is raked clean of leaves, clods, and weeds, in order that the figs may drop on soft soil without injury from bursting.

Drying floors or beds are used for the final drying of the figs. These beds are low—about 6 or 8 inches high—simply made of loose soil, like a common garden bed. They are long and narrow—6 or 8 feet wide and 50 or 100 feet long—separated by walks about 4 feet wide. Along the outside margin of these beds are driven pegs which, when in the soil, protrude but slightly above the bed. Between these pegs willow or other thin branches or arundo canes are

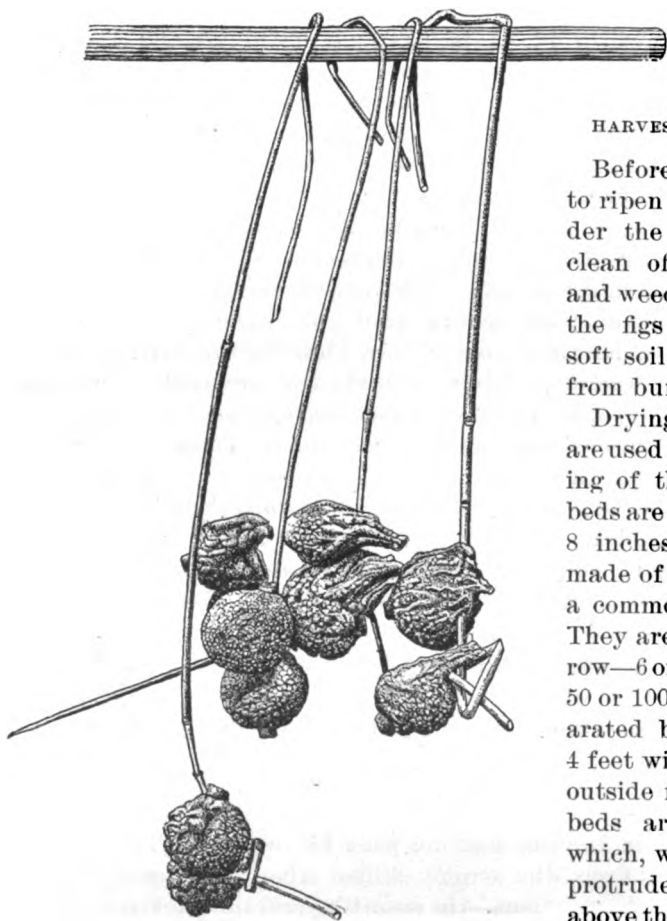


FIG. 3.—Caprifigs used for caprification, strung on Esparto grass, as used in Sicily. The figs have become dried and the wasps have escaped. (Photograph by N. B. Pierce.)

braided, in order to protect the bed and prevent the soil from falling out on the walks. The tops of the beds are first stamped hard and wetted, then covered with mats made of rushes or esparto grass or of the split canes of the Italian cane (*Arundo donax*). On these mats the figs are dried. Many of the poorer growers cover the beds with the split arundo canes.

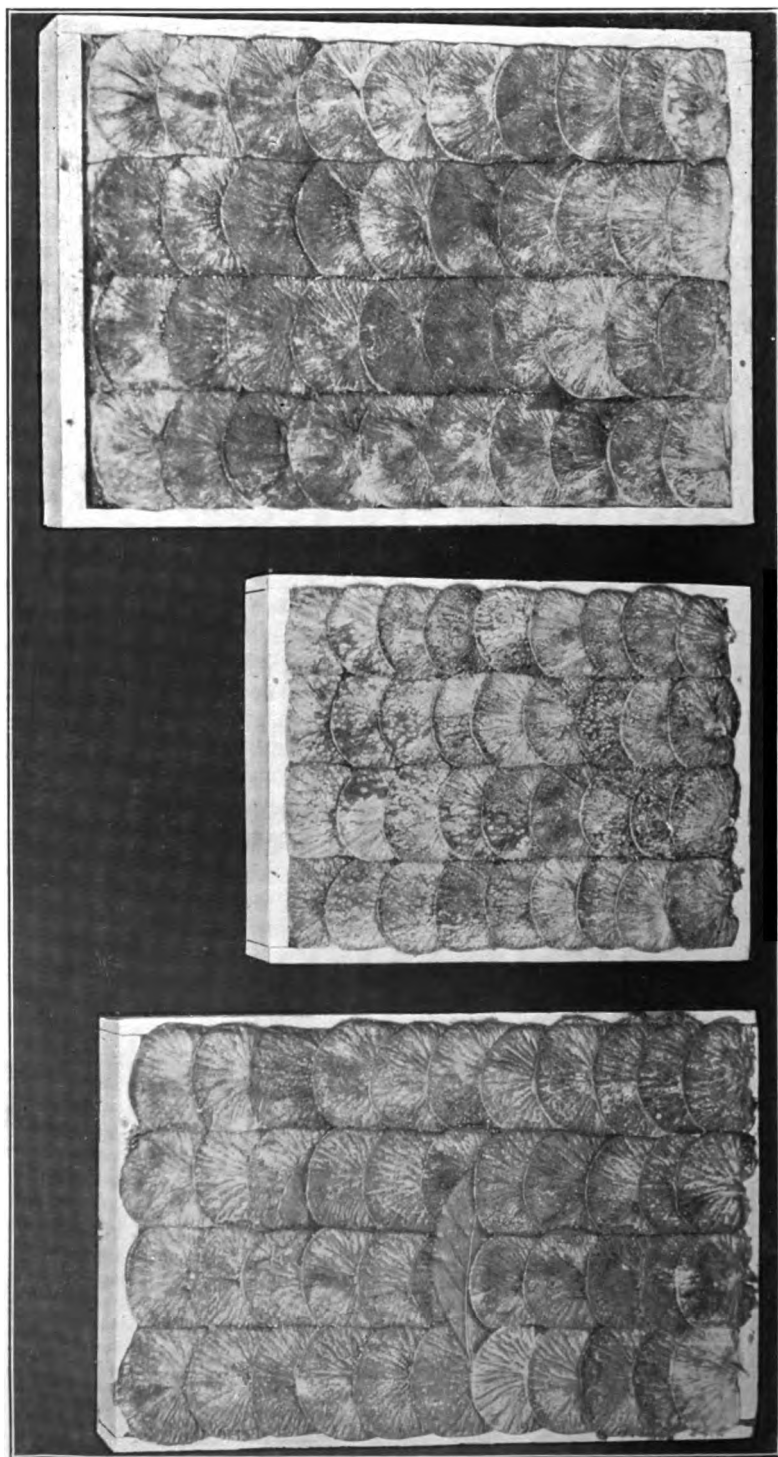
At the end of July the figs begin to mature. The fig is never cut from the tree, but falls of its own accord when partially cured or overripe. At first the figs drop a few at a time, and but few laborers are required, the picker having to glean all over the ground in order to fill a basket. In August, however, the figs fall thick and fast, and the whole laboring population is required to pick and dry the crop.

The figs are never picked up while covered with dew, but only when perfectly dry. The most favorable time for picking is during the blowing of the north wind, as the figs then dry better and assume a better color. The figs are picked up into wicker baskets and immediately conveyed to the drying ground near by, where they are carefully spread out singly, none being allowed to overlap another, in order that they may receive the necessary sun and heat.

After three to four days of exposure those figs which are dried sufficiently are taken up, divided roughly into three different grades, and care taken that they do not dry too much. The skin must feel dry, but the inside must be soft. The very choicest figs are conveyed to Smyrna in baskets. The general grade, or "eleme," is dumped in sacks made of goat hair and camel's hair, while for the third or poorer grade or "horda" common, yellow-colored sacks are used. The goat-hair sacks are very durable, and do not become so sticky from any exuding juice. They are also impervious to dust. These bags are also very expensive, and, indeed, are very seldom owned by the growers, but hired from the "devegees," or camel men, who carry the figs to the railroads and to Aidin. These devegees are in reality contractors who haul the crop away, ship it on the railroads, accompany it to Aidin, and finally dispose of the figs to the traders there. They constitute a real corporation of middlemen, known for their honesty and capability. Their work for the season ends only with turning the sum received for the sale over to the grower. The guild of the devegees is an important one in Smyrna. The compensation of the devegee is 7 per cent of the sale.

PACKING.

The fig grower in Smyrna does not pack his own figs. The packing is done by special firms who employ skilled labor. The packing consists of two distinct operations—the assorting and the packing proper. The assorting is done by comparatively unskilled labor, women being always employed for this part of the work. The figs are dumped from their hair sacks on mats spread directly on the floor, and girls and women squat down around the piles. Each woman has in front of her at least three baskets, into which she assorts the fruit, in three grades, while the refuse remains on the floor to be packed in 50-pound bags, which are disposed of for home use or shipped to England and France for distilling, etc. The grade is determined by size, color, thinness of skin, etc., and is judged by both eye and hand.



THREE BOXES OF LAYER FIGS FROM SMYRNA.

The 5-pound box contains 4 rows of 9 figs each, and 5 layers in depth; inside measurements of box are as follows: 24 by 74 by 94 inches. The 8-pound box contains 4 rows of 11 figs each, and 5 layers in depth; inside measurements of box are 24 by 84 by 124 inches. The 12-pound box contains 4 rows of 10 figs each, and 6 layers in depth; inside measurements are 24 by 94 by 134 inches. Photograph by Paddock & Fowler Company.

These assorted figs are carried away by men to the packing rooms and are now known as "maccaronia." The packing proper is done by men in separate rooms and on rough tables. This process consists of two operations—pulling and splitting, and packing. Each packer has in front of him a jar with salt water for moistening the hands, which are always kept wet in order that the figs may not stick. Next the figs which are packed as "eleme" are pulled and drawn between the fingers and thumb into a flat dish-like form and then the back part is split, which allows still more spreading of the fig. In pulling the fig the "eye" part is brought into the center of the disk, which gives to the other part a handsome appearance, the coarse and thick part of the fig being centered around the eye. All the best figs are packed in boxes containing from $2\frac{1}{2}$ to 50 pounds. They are placed in regular rows, without any guide, and so skillfully is this done that the lines between the rows are perfectly straight and even to such a degree that a sheet of paper may be dropped between them. The rows all consist of layers, one on the top of the other, all through the box. When finally the box is filled it is passed out to women, who place laurel leaves between the figs of the top layer, after which the carpenters nail the boxes and trim them off. (Pl. II.)

Another and better mode of packing is employed with so-called locoum figs. These are not pulled and split, but pressed between the fingers until they become almost square, and are then packed closely together. In all this packing no presses are used. The "eleme" boxes are simply piled upon the floor, one on the top of the other, which presses them sufficiently. The poorer grades are packed in barrels in concentric rows. When such a barrel is full a loose bottom is put in and the packer gets in and tamps it down in order to compress the figs solidly. By the middle of October the packing is generally over and the packing establishments are closed for the year. In some of these large packing houses as many as 500 hands are employed; 150 of these are women, 50 boys and girls, and 300 men.

BRANDS AND BOXES.

There are two great brands of Smyrna figs—the "eleme" and the "locoum." The former are always packed flattened out, the latter like little cubes. The word "eleme" means "select," or better, the "cream," as it were, skimmed out of a lot of common figs. Through habit this brand of fig is always first pulled, flattened, split, and pressed, and on this account it has been repeatedly stated that "eleme" means "pulled," which, however, is not the true meaning of the word.

Locoum indicates a square cube of so-called fig paste, a kind of sweetmeat made of sugar and starch and a little coloring matter, without any particle of fig in it. This very stuff is also sold in many American cities under various names, as sugar figs, fig paste, etc. It generally comes as a square sack, or cube, probably originally

intended to imitate the fig. The Turkish name for this paste is "Locoum," and the brand "Locoum" on the box containing real figs indicates the manner of packing, in imitation of the Locoum pastes. The fig can not be worked in the shape of "Locoum" unless it is unusually thick and meaty, and therefore the best figs are always selected for that style of packing. The figs branded "Erbelli" come from the country surrounding the smaller village of Erbeghli, which has the reputation of growing the finest figs. The Erbelli figs are generally packed as "Locoum," and frequently both names appear on a box, indicating that the figs come from Erbeghli and are packed Locoum style. (Pl. III.)

Exporters put all kinds of fancy names on the figs which they send out, and vary them from time to time. Every year sees some novelties as to name, style of packing, package, etc. But two or three firms have adopted regular brands and goods which can be relied on to be uniform and regular one year with another. Messrs. Dutilth & Co., Smyrna packers, have kindly furnished the following information:

The best brands are graded as follows:

Imperials	Imperial Crown.
London layers	Extra $\frac{22}{22}$ blue (4 crowns).
Choice	Finest $\frac{22}{22}$ red (3 crowns).
Prime	Fine $\frac{22}{22}$ black (2 crowns).

These grades go both to England and America, no grade being packed exclusively for England or for America. The only brands which come always in the same manner of packages are those just referred to; all other package-marks vary as regards name, brands, sizes of packages, number of figs in each package, etc., greatly, of course, to the detriment of the trade, but more so to the packers themselves.

The inside measures, in inches, of the fig package of E. J. L. are as follows:

Imperial crown, 12½ by 16½, carrying 5 rows of figs with 11 figs in a row.

Extras differ in size of box, a 9-pound box, measuring 9 by 11½, carrying 4 rows of 8 figs each. Of this grade there are 12, 18, and 5 pound boxes also.

Finest are put up in 8, 10, and 12 pound boxes. The 12-pound box measures 10 by 14 and contains 4 rows of figs each.

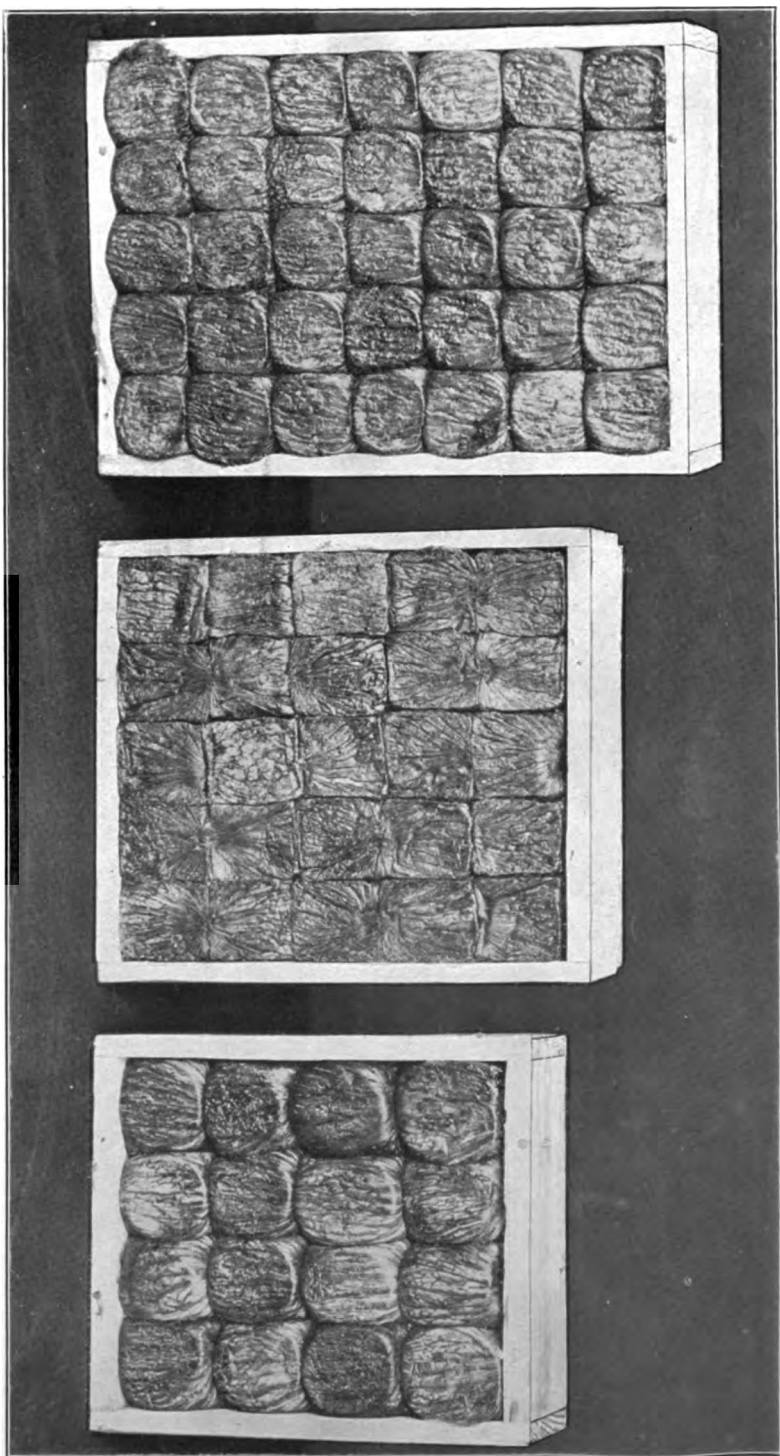
Fine are put up in 10-pound boxes only, measuring 9 by 12, containing 5 rows of figs, with 11 figs in the row.

In these brands one always finds the same size of figs, whether they are in a 12, 10, or 8 pound box of the same grade.

The general run, or what is called the American standard, measures as follows:

	Inches.
12-pound box, 5×11 figs	9.5 by 13
10-pound box, 5×10 figs	8.4 by 12.2
8-pound box, 4×9 figs	7.1 by 11.5
6-pound box, 4×8 figs	7.2 by 9.4

These figs seldom contain the same number of figs in the lower layers as in the upper layers. Thus for the ordinary grade of figs—American standard—it is the general custom to put a smaller fig in the lower rows. Thus a box will have 5 by 11 figs on top, while below them 5 by 13, etc.; but the standard brands always come with the same number of figs all through. The lumber for these boxes all



THREE BOXES OF LOOCUM FIGS.

Center box packed in English style, with square corners; outside boxes are packed in American style, with round corners; two smaller boxes are of same quality, best in the market; largest box is of the second quality. American style of packing is handsome, but allows air to enter among the figs, causing them to dry quicker. Measurements: The small box contains 24 pounds, 4 rows of figs, 4 in each row, 3 layers in depth; inside measurements are 24 by 6 by 7 inches. The middle box contains 4 pounds, 5 rows with 5 figs in the row, and 3 layers in depth; inside measurements are 24 by 6 by 7 inches. The largest box contains 5 pounds, 5 rows of 7 figs each, and 3 layers in depth; inside measurements are 24 by 6 by 9 inches. Photograph by Paddock & Fowler Company.

comes from Austria. No regular price list is offered from Smyrna. When the figs arrive in this country they are at once placed in the hands of brokers in the United States, who draw samples and sell on sample boxes.

The English trade prefers smaller packages, such as 1, 2, 4, 6, and 8 pounds, while the United States have them almost all running 8, 10, and 12 pounds. A small quantity of 6-pound boxes will sell, but only a very few. A few of 1, 2, and 4 will also sell.

The price of Smyrna figs varies considerably with the season, as well as with the quality. The average price for ten years for the last three grades has been as follows: Per quintal of 112 pounds, \$4.08, \$8.75, and \$19.22, all in the Smyrna market, packed.

As may be judged from the foregoing statements, the peculiarities of the Smyrna fig trade, through which it has attained the height and prosperity it now enjoys, are as follows:

A peculiar class of figs which require caprification. Of these figs there are three principal varieties grown for commerce. A favorable climate—dry, warm, and moderate, both winter and summer; rich soil, which retains moisture and which does not require irrigation; extreme care in selecting, assorting, grading, and packing; established grades, which can be relied upon year after year.

EXPORTATIONS.

The best grades have always been taken by England, Germany and the United States coming next. Of late years, however, the United States has begun to consume much better grades. The production of figs in California is also reducing the importations to the United States. The poorest grades are used in France for distillation and are exported to Austria and eastern Europe generally for distilling, as well as for the adulteration of roasted coffee. The production of figs has greatly increased of late years in Smyrna and its vicinity. In 1870 about 6,000 tons of dried figs were brought to Smyrna for packing from the valleys where they were grown. In 1882 about 10,600 tons were brought in for packing, while about 7,000 tons, valued at about \$1,600,000, were exported to France, England, Germany, and the United States. At the present time the production has considerably increased, and probably about 13,000 tons are now packed yearly.

FIG CULTURE IN GREECE.

GENERAL HISTORY.

The history of the fig in ancient times in Greece has already been briefly discussed. Originally the fig was introduced from the Orient at a time somewhat later than the Trojan war, or a little before the eighth century before Christ. The Grecian islands were the first to receive the fig, and the fruit soon spread throughout Greece and became highly appreciated by a people who had for ages partly subsisted on acorns from the native trees. The mythological fables relate

how the goddess Demeter visited that country and that one night she was belated and was given a friendly and hospitable reception by Phytalos. In return for the hospitality, she bade the fig tree spring from the ground in the same manner in which Minerva had caused the olive to appear. In time the fig became a sacred tree and second only to the olive in importance. By the time of Theophrast a large number of fig varieties had been originated and imported. These varieties are, however, so indefinitely described that they can not be identified with any now existing, though it is possible that some of them may yet survive. The ancient Greeks knew the caprifig well under the names of Olynthos and Tragos, the latter being the name used by the Messenians. Other names of this tree were Erineos (*Εῤῥινεύς*) and Sycheagria (*Συχήαγρια*)—in new Greek Agriosykia (*Αγριοσυκιά*).

The best figs in ancient times were those grown in Attica. They were so highly valued and considered so necessary for home use that a law was passed prohibiting their export. Until this law was promulgated smuggling, it was said, was unknown, but from that time it became a common and profitable business to secretly export and sell figs. To prevent this practice, special guardians were appointed by the Government to watch and accuse those who broke the law. These guardians were called sycophants (from sykon, a fig, and phainein, to show). These officers of the law soon became hated on account of the blackmail used by them for their own enrichment, and the word sycophant became synonymous with the idea of a secret spy. This meaning of the word has survived to this day.

The fig had among the ancient Greeks a sacred, symbolic, and mystic meaning, an emblem of fertility and propagation. The flowers of the fig were hidden, while all other flowers were open to the light of the sun. The fig soon became a religious and mythical symbol in the festivities and worship of the god Dionysios, and a basket of fresh figs was carried next to the vessel containing the wine destined as offering to that god.

FIGS IN MODERN GREECE.

The cultivated and edible fig is known in Greece as "he sykea" (*ἡ συκία*), and the figs are known as "ta syka" (*τα σύκα*). The old Pelasgic name was "fik," plural "fikj," and from this word has originated the modern word "fig," as well as the ancient Latin word "ficus."

In modern times the fig tree is extensively cultivated all over Greece, in the mainland as well as on the islands, and many varieties are cultivated. Among these the very early kinds are known as "proima" (*πρόιμα*). The best and earliest of these come from Ægina, and are ripe in the month of June. Other famous varieties are the so-called Smyrna varieties, or the "Smyrnaia," though we have no means of knowing whether or not they actually are identical

with those grown in Smyrna in Asia Minor. Other varieties, bearing only or principally large first-crop figs, are known as "basilika" (*βασιλικά*) or "royals." They are generally dark and used only for the table.

The figs for drying and export come principally from Kalamata, a

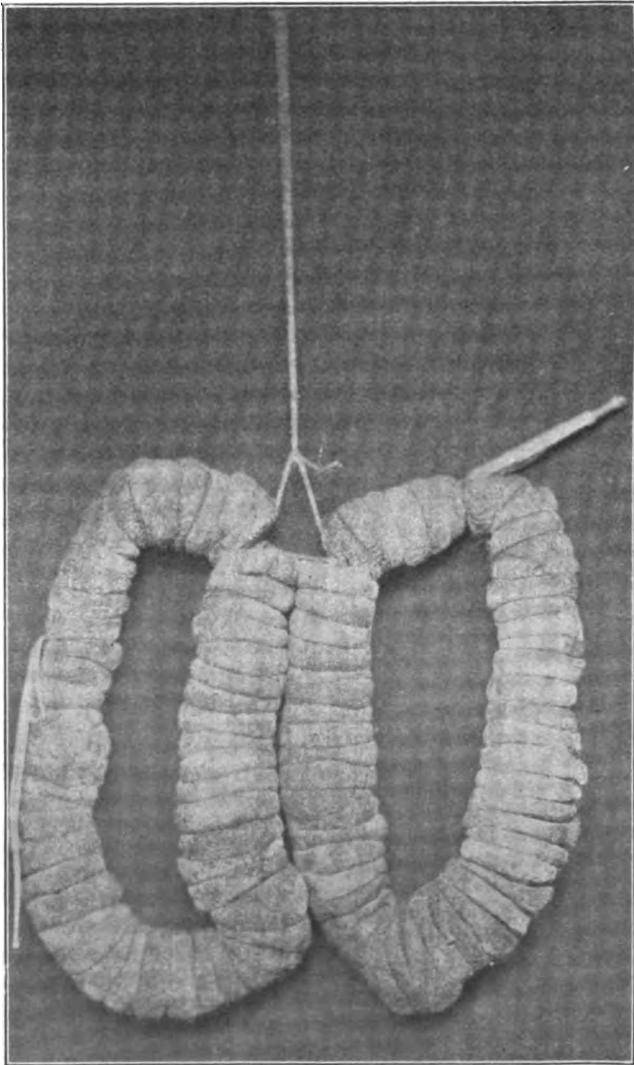


FIG. 4.—String of figs as packed in Greece. (Photograph by Paddock & Fowler Co.)

place also celebrated for its "currant" raisins. The islands of Andros and Syros are also well known for their figs, though they are inferior to those of Kalamata. The crop from the latter place is principally exported to Russia, Austria, and central Europe generally. A few reach France and the United States. The bulk of all these figs is

used for the manufacture of "coffe" and brandy. The figs from Andros are of a dark brown color, owing to the mode of curing and drying in heated ovens. The Kalamata figs, which are now and then found in the United States, are vastly inferior to the imported Smyrna figs and are not even equal to uncaperfigated California figs, the quality of which has in late years greatly improved. As regards the cultivation of the trees and the curing of the figs in Greece little of value is to be noted. As the figs are of inferior quality the methods of producing them must also be inferior. The gathering of the figs for drying commences about August 1 to 5. The ripe ones are cut from the tree by a reed split at one end. Only the ripe ones are gathered, the others being allowed to hang until ripe. The cut figs are placed on the ground to dry. In places where more care is taken low beds of soil are covered with straw and stamped hard. The beds are divided in sections 39 inches in width. At each side there is a ditch to receive the occasional rains. On this account the center of the beds is slightly raised in order that the rain may more readily flow off. When the figs have been exposed for about four days they are turned, about eight days being required to finish the drying. The Grecian mode of packing (fig. 4) is a most primitive one, probably actuated by the want of proper material for boxes. The figs are simply strung on reeds to the number of from 50 to several hundred. These strings are then formed into wheels of various shapes and weights and are then packed in larger boxes. Such wheels are not uncommon in the markets of the United States. Most of the Grecian figs are caprified, as can be readily demonstrated by cutting the figs open and examining the seeds. The latter mostly possess embryo. Only rarely have imported Grecian figs been seen which had not been caprified. The figs are exported in large quantities from Calames and Andros. The next largest places from which the Greek figs are exported are Caryntie, Tenos, Pylia, etc. The export, which is steadily increasing, now reaches some 30,000,000 pounds annually. The poor quality of the Greek figs is the more remarkable, as the majority of the laborers in the Smyrna packing houses are Greeks.

Caprification, as has been stated, was practiced in Greece in very ancient times. Whether the caprification was introduced or was indigenous can not now be decided with certainty; but it is probable that the fig and the caprification were introduced together. It has been stated that during the eighth century before Christ edible figs were growing in Greece, and it is certain that caprification was known at the time. From that time to this caprification has continually been practiced and is an inseparable process in the cultivation of the fig. The wild or caprification figs are called *ῥοπία* or *ῥοπιῖος*, while in ancient times they were known as *ἐπὶ νεὸς* or *ἐπὶ νεὸς*. The Pelasgic name for the caprification fig was "piri." At present the caprification fig grows in great abundance in waste places and among rocks all over the country. So common is the

caprifig that at times ship loads are exported to Smyrna to serve in caprification when the native caprifigs fail to yield on account of unfavorable seasons. The French botanists, Tournefort and Olivier, who were greatly prejudiced against caprification, tried to prove its worthlessness by the fact that Greek peasants had been seen to suspend oak galls and excrescences of elms and poplars in the fig trees instead of caprifigs. Such foreign substances could naturally have no effect in pollinating the figs, and the figs so practiced on would have set in any case. This observation of the botanists in question shows that in Greece varieties are grown which are similar to those we have in this country and which require no caprification in order to produce figs.

Among the most interesting of the Greek caprifigs is the variety known as *Erinosyce*. This fig, which bears caprifigs as a first crop, produces a second crop of edible figs. A somewhat similar fig has been found in Brittany and lately also in California.

FIGS IN NORTHERN AFRICA.

EGYPT AND KABYLIA.

Figs have been grown in Egypt since very ancient times, but still that country cuts a comparatively small figure in the fig market of the world. Though some 2,000,000 pounds of dried figs are exported every year, they are of inferior quality and are used principally for the production of spirits and the adulteration of coffee or the manufacture of imitation "coffee." A much more important fig district than Egypt is found in Kabylia. This district, which is a part of Algeria, is situated east of the city of Algiers and extends from Dellys to Bougie. The principal town in this district, Tizi Ouzou, is surrounded by the largest fig district in the world outside of Smyrna. Not only are figs exported in large quantities, but the whole native population subsists on figs for many months in the year. The following account of the fig industry in the district is mainly from Hanoteau and Letourneux:

Fig culture in Kabylia.

Localities.—The fig flourishes everywhere and is found not only in the lower levels, but to an altitude of over 3,000 feet. In the vicinity of Aït Onâban it reaches to the zone of the cedars.

Varieties.—The Kabyles distinguish some twenty-eight varieties of edible figs, besides a number of caprifigs used exclusively for caprification. Of the latter there are four distinct kinds. The edible figs are either white or black.

White varieties.—Abakour amellal (early white), Ar'nim, Thar'animt, Thabouhiaboult, Abouh'archaou, Thar'erat, Thadhesouith, Thamellalt, Thar'elit, Thâ-amerionth, Thabellont', Aberzigzaou, Thaouassifth, Aboulil, Abouzouggar', Thakournennaïth (the round).

Violet varieties.—Abakour aberkan (early black), Ajenjar, Azaïch, Thâzaïcht, El-Hadj, Abelr'endjour, Mezzith, Aouhalal, Ar'animaberkan, Thabouhiaboult, Thaberkant, Abouremman, Azagour guilef (Boar's back).

The variety called Thar'animt is the most valued among the white figs, and the variety known as Ajenjar is considered the finest black kind.

Capriffs.—There are four named varieties of capriffs. These are: Thadoukkarth-en-tifouzal, Thadoukkarth-en-thar'animt, Thadoukkarth-en-thaberkant (black capriff), Thadoukkarth-en-t'it-en-tesekkourth (Pheasant's eye capriff). The best variety is the Thadoukkart-en-tifouzal. The name of the capriff in general is "doukkar." These varieties of capriffs are used indiscriminately. As regards caprification some kinds are better than others, the difference being in the time of maturity, in the number of crops, and in the number of wasps.

There is another variety of wild fig known as Thadoukkart guir'zer (Creek capriff), but the fruits of this kind are never used for caprification. This tree is used for grafting. The tree is inhabited by a *Blastophaga* wasp not suitable for caprification.

Propagation of the fig tree.—There are four different ways in which the fig tree is propagated. These are cuttings planted directly in the orchard, cuttings planted in the nursery and later on transplanted, suckers taken from the base of the tree or from its roots, and, finally, layers.

Cuttings planted in the orchard are known as "thisekkar." They grow well and rapidly, but are supposed not to bear for several years. Cuttings planted first in the nursery are called "thimer'eras." After two or three years these are transplanted into the orchard. These young trees bring a price of from 30 to 50 centimes. The suckers are known as "ouchelikhen." The name for layers is "ourk'ilen."

When a fig tree is planted, a trench is dug: not a simple hole, as for other kinds of trees. Several alits are made in the trunk in order to facilitate the growth of roots. The time for planting is between October and March. The trees are generally set in groups of five, though irregularly.

Grafting is also used, but only when it is desired to change one variety into another, or in order to rejuvenate some old trunks. Grafting with scions is practiced in February and March, while budding is practiced from March to June.

Cultivation, etc.—In very cold winters the buds of the more delicate varieties are covered with a plaster composed of cowdung, in order to prevent injury from frost. The first work in winter consists in cleaning the trunks of the trees—cutting off the suckers and superfluous surface roots. Sinks are dug around each tree in order to hold the rainwater. When manure is had, it is placed in these sinks. Plowing is done with oxen when the proprietor is wealthy enough to possess them; otherwise the trees are simply dug around. Ancient practice stipulates that the first plowing should be made from January 10 to 23. The second plowing should be between February 13 and 19, while the third and last takes place either between April 10 and 20 or between May 1 and 21. In some places pearl barley and turnips are planted between the trees after the last plowing, but such crops are always considered detrimental to the fig trees. No pruning of the trees is practiced.

Caprification.—The capriff is known as the "Doukkar," which signifies "male." But as the Kabyles are ignorant of the sexual elements of the capriff or of plants in general the presumption is that the origin of the name is very ancient, and we are naturally carried back to a time when the people knew more of the nature of plants than they now do in those parts. The *Blastophaga* wasps are of a black color. Those, however, from the wild capriff, known as "thadoukkart guir'zer," are brown. These latter insects are not able to caprify the edible figs. The caprification is practiced in the same general way as elsewhere in the Mediterranean countries. Strings of four capriffs are thrown over the branches of the edible figs. The number of strings (imalak'en) varies with the tree. If necessary, as many as 100 strings or 400 capriffs are used on a single tree. On the plains more strings are used than in the mountains, the average number of

strings being, perhaps, 20 to 30 on a tree. After a few weeks, when the "douk-kar" begin to dry up, the process of caprification is renewed. This is repeated as many as four to six times during the summer. The expense of caprifying the trees is considerable. Each string of capriffs costs about 5 centimes, which brings the highest cost of caprification for a single tree up to 5 francs a year. Some tribes forbid the exportation of capriffs outside of their boundary, but as a rule the markets are full of capriffs, offered for sale during the period when caprification is considered necessary.

Figs requiring caprification.—Not all fig varieties require caprification. Those varieties which do not require caprification are Abakour, Ar'anim, Abouh'archaou, Abouremman, Azagour guilef, Azaïch, Aboulil, Abelr'endjour, Thazerat, and Thadhefouith. The varieties which it is necessary to caprificate are Thar'animt, El-hadj, Abouzouggar, Mezzith, and Thâzaïcht.

The brebas are known as "Ourgalen," except those of the variety "Abakour," the brebas of which are called "bakour" (early).

Curing and drying.—The figs are dried on trays made of reeds. The latter are exposed to the full glare of the sun, but are stacked at night, 15 or more trays being superposed one on the other. When dried, the figs are stored in earthen jars or in large baskets. In order to keep away vermin, leaves of the sweet bay and of the "zater" (*Calaminta nepeta*) are interposed among the figs. The mode of packing used in Greece is also in vogue in the districts nearest the Mediterranean, but this more elaborate way of packing is used only for the figs destined for exportation. The quality is generally good, but the packing is always poor and prevents extensive sales and high prices.

From 18 to 25 francs are realized for a kilo of the best dried figs.

FIGS IN ITALY.

Cato, who lived two centuries before Pliny, knew 6 varieties of figs. In the beginning of the Christian era Pliny, the well-known naturalist, enumerated some 27 different varieties. The names given them are either from the places where they were growing or they were named after persons who had introduced them or who cultivated them. Thus we read of Rhodian figs, of others as African, Hyrcanian, Lydian, Tivolian, Herculean, Pompeian, Livian, the latter introduced by Livia. As might be expected, these figs are not so minutely described as to enable us to identify them with kinds now existing in Italy or elsewhere. From the time of Pliny to modern times we find no published accounts of Italian figs. Still, during the long interval new varieties must have been introduced and originated by chance or otherwise, as the first of the earliest of the modern writers, Porta and Pontedera—the former in the first years of the seventeenth century, the latter a hundred years later—mention a great number of distinct and valuable kinds.

EXTENT AND CHARACTER OF THE ITALIAN FIG DISTRICTS.

While fig trees are grown all through the Italian peninsula and its adjoining islands, the true and principal fig region must be considered as that situated south of Rome, and extending from there to Sicily and the Liparian Islands. In northern Italy figs are grown principally for eating fresh, and as such can not be said to constitute an

article of important diet. Few figs are dried, and they entirely for home consumption, not for export. In the southern parts of Italy, however, the fig, fresh and dried, is looked upon as an important and cheap article of diet, especially during the winter months, and the failure to secure a large fig crop is looked upon as a calamity, both on account of the diminished food supply and the pecuniary loss in the export trade; and the export trade must mean, in this part of Italy, not only the export to foreign districts, but the much greater export to Italian districts where figs are not grown, or at least not dried.

While figs are growing almost everywhere in southern Italy, comparatively few localities make fig culture an industry. Thus for fig culture favored spots appear comparatively few and far between, confined to certain valleys or to certain slopes which either through soil, location, or climate conditions produce figs superior for drying.

The most northern district in which superior dried figs are produced is Pozzuoli, not far from Naples. The soil in this district appears to be of volcanic alluvium, especially adapted to producing figs of thin and white skin, good flavor, and great sweetness. In the Naples market these Pozzuoli figs compete successfully with those of more southern districts and bring even a better price than the Calabrian figs. In the same vicinity we find a considerable quantity of dried figs produced on the island Ischia, at Sora in Terra di Lavoro, at Vico Equense, peninsula Sorrentina, etc. As a rule these northern figs are small, averaging about one-third the size of the Smyrna figs, while in sweetness they are hardly equal to the Smyrnas. As we proceed south we find the figs slightly increasing in size, and to some degree even in sweetness. In southern Italy the principal fig centers are found in the provinces of Terra d'Otranto, Cosenza, Catanzaro, and Reggio, the latter generally known as the three Calabrias. Other centers for fig culture are found in the provinces of Lecce, Salerno, and Basilicata. In Terra d'Otranto, on the Adriatic side, excellent dried figs are produced at Taranto, Brindisi, and Melpignano. In Lecce, in 1873, the two communes of Cutrofiano and Galatina produced 5,700 quintals or 638,000 pounds of figs, while the three ports, Taranto, Gallipoli, and Brindisi, exported in 1872 about 70,000 quintals, equal to 7,840,000 pounds. The whole exports of the province Terra d'Otranto for three years of 1870 to 1872 reached 132,099 quintals, 1 quintal being about 112 pounds.

The production of dried figs in the immediate vicinity of Lecce in 1869 reached 11,000 quintals, and has since that time somewhat increased. In the province of Catanzaro the exportation of figs, in 1874, amounted to 7,000 quintals, or 780,000 pounds. In the province of Cosenza the three principal localities for the production of dried figs are Cosenza, Castrovillari, and Paola, while the following communes also made a specialty of drying figs: Amantea, Belvedere,



FIG. 1.—CAPRIFICATED FIG TREE IN EASTERN SICILY.

Tree is of a *Smyrna* variety and is hung with strings of caprifigs.

Photographs by N. B. Pierce.



FIG. 2.—CAPRIFIG TREE IN SYRACUSE, SICILY.

Belmonte, Longobardi, San Lucido, Scalea, Cleto, Serra di Aiello, Fiume-Freddo, Santa Domenica, Majerà, Orsomarso, and Verbicaro.

In the province of Reggio the dried figs are produced for export, principally in the vicinity of Reggio, Palma, and Gerace, the latter place being especially famous for its dried figs. In Terra di Bari the fig regions are found in the vicinity of Moropoli and Turi, the figs from the former locality being among the largest and sweetest in southern Italy.

As could be expected, the island of Sicily produces good and sweet figs. Foremost are those from the vicinity of Palermo, among which may be found the largest figs produced in Italy, almost equaling those of Smyrna in size, while exceeding them in sweetness. The principal localities for figs in that province are San Fratello and Pollina. The Palermo figs do not equal the Smyrna figs in flavor and thinness of skin. (Pl. IV.)

The province of Messina, rich in oranges and lemons, also produces good figs, though immediately around Messina no fresh figs are produced, that town importing its supply from the ports of Calabria, on the other side of the Straits. The principal export port in the province of Messina is Milazzo.

In the province of Catania it is especially in the region of Mount Etna that superior dried figs are found. The volcanic soils favor the drying quality of the figs as well as their sweetness. Figs are also prepared for drying in the other parts of Sicily, but nowhere to the same extent as in the provinces of Palermo, Messina, and Catania. The figs from the island of Lipari are, however, considered superior to those grown on the main island. These figs are exported principally to Naples and Malta.

CLIMATIC CONDITIONS.

In most of the Italian fig districts the best figs for drying are grown on or near the coast of the Mediterranean. The influence of the sea, be it through modified heat or through increase in moisture, is decidedly beneficial. The climatic conditions for the production of figs in southern Italy are almost perfect, and inferior only to those of Smyrna in Asia Minor. But for the successful drying of figs, not to say curing of figs, the climate of Italy is not the very best. At the time of the fig harvest it not infrequently happens that showers, or even continued rains, set in, injuring or even completely spoiling the figs. On that account the growers resort to such measures as splitting the figs or drying them by artificial means in primitive ovens. In climatic conditions for drying Smyrna is much more favored than Italy. The natural rainfall in Italy is slightly less than that of Smyrna, but greater than that of southern and central California. The irrigation of fig trees is therefore less necessary in Italy than in California.

QUALITY OF ITALIAN FIGS.

But with all these favorable conditions Italy produces only figs which are inferior to those of Smyrna, though equal to those of Portugal, Spain, or France. It is especially in size and quality of pulp that the Italian figs are defective, averaging one-third less in weight than the Smyrna figs. Their flavor is also inferior, while in sweetness they are equal, or in a few instances even superior, to the figs of Asia Minor, Smyrna included. As regards albuminoids, so important when the nutritious quality of the figs is taken into consideration, the Italian figs take a very prominent place, but are still inferior to the Smyrna figs. In fatty substances the Italian figs are perhaps superior to the Smyrnas, but the percentage of superiority is too small to be of any economic importance. In thinness of skin and in color the Italian figs of the best kinds compare unfavorably with Smyrna figs. To sum up, the Italian figs are inferior in size, aroma, and albuminoids, but excel in sweetness and in other minor matters. Their meat is generally coarse.

MODES OF CURING AND PACKING.

As Italy does not in reality produce any first-class figs, it could not be expected that she would excel in curing and packing. Only where a very superior product is the outcome of careful horticultural methods does it pay to spend much labor and skill on attractive packing. The Italian figs are grown principally for home consumption by the poorer classes of the people, and the object has therefore been to cure and pack as cheaply as possible. The exports are considerable, but the figs, instead of serving as table desserts and delicacies, are destined principally for distillation or for the adulteration of coffee, etc. Still, the Italian figs of the better classes, if properly put up and more carefully and cleanly handled, would command a market and a price far beyond that at present received. The Italian modes of curing could be imitated profitably in the United States, especially when an expensive article is not contemplated. The time will come when our horticulturists will occupy themselves with the problem of preparing articles of food as well as of luxury, and they may then find some points of interest in the Italian modes of curing figs. In Italy there are three principal ways of curing and drying the figs, these methods being used promiscuously in different parts of the country without being confined to special localities.

The most common way is, after the figs have been properly picked as early in the day as possible, to split them lengthwise down to the peduncle or stalk end, where the two halves are allowed to remain connected. This splitting serves a double purpose, enabling the operator to detect the poor or sour figs and facilitating the drying of the fig. The splitting also does away with the laborious turning of the figs while drying. As soon as split, the figs are exposed on wicker trays or

straw mats for drying. The interior surface is turned upward; otherwise the contents would run to waste. The time for drying varies from six to ten days, according to locality and climate. The figs are then taken in and dipped, which is done by placing them in wicker baskets and immersing them for a minute in boiling water. When removed the figs are thrown in heaps to drain off and dry and are then ready for packing. Such figs are in the province of Catania called figs "a chiappa" (flattened).

Another method nearly related to the former consists in splitting and drying the figs just as last described. When nearly dry the figs are flavored. This is done in different ways in different localities—a quarter of a walnut is pressed into the pulp, or a piece of citron rind, or the pulp is simply sprinkled with anise seed. Such flavored figs find ready sale all over Italy, and not a few are exported to foreign countries.

The third way of drying figs is known as "passuluni" (wrinkled) in Catania or as "cuzzoli" (drawn out) on the mainland in the Calabrias. When perfectly ripe the figs are carefully cut with a knife from the tree and then distributed on mats made of split cane (*Arundo donax*), the mats being spread on low beds of earth. The figs are turned every day or every two days and exposed to the full rays of the sun. The more frequently the figs are turned the better, many persons turning them several times daily. In from ten to fifteen days the figs have become bleached and dry externally, while the pulp remains soft, at least in the better specimens. The figs are then assorted and graded. Dipping in hot water for one minute comes next and finishes the operation of curing. The most careful curing is done in Catanzaro and in the district of Palermo, in Sicily.

PACKING.

The packing of Italian figs is quite primitive, owing to the scarcity and expensiveness of lumber for boxes. Braided mats, made either of strips of beechwood or of esparto grass (*Stipa tenacissima*), holding from 33 to 44 pounds each, are the most common packages for all export figs destined for distillation, etc. Table figs are generally exported in round drums made of wood shavings containing 12 to 15 pounds of figs, there being no uniform packing. For home consumption the better classes of figs are strung on split reeds or esparto straw.

The packing of figs is further advanced in Sicily than elsewhere in Italy. The packing called "pania" consists of piercing the figs with split canes, a sixth part of a cane being the proper thickness. Two and two figs are placed overlapping each other with the stalk ends, and a sliver of cane is then run through this overlapping part. Another sliver is run through the thick end of each fig. In this way more figs are put on and these slivers of cane are made to hold a loaf of figs 4 inches wide by 20 inches long.

This packing is varied almost indefinitely in different places. Figs are strung on the elastic and tough straws of the esparto and finally rolled up in the shape of balls or in wheels (*scerti di ficu*). The squares are generally known as "*tavolieri*" (tables) or "*pania*" (loaf).

Some of the largest figs are also picked and dried without skin and known as "*ficu senza scorcia*" (without skin) in the Catanian dialect.



FIG. 5.—White Genoa fig.

A confiture is made in some districts by dipping the nearly dried figs in honey, then packing them in jars, and baking in an oven. In all districts common bake ovens of most primitive construction are used for drying inferior figs or for finishing the drying of the regular figs in case of rain or continued fogs. But such artificially dried figs are inferior both as regards color and quality and bring much less in the market.

VARIETIES OF FIGS.

The varieties of figs grown in Italy are many, in some localities reaching a hundred or more. A great uncertainty exists in regard to

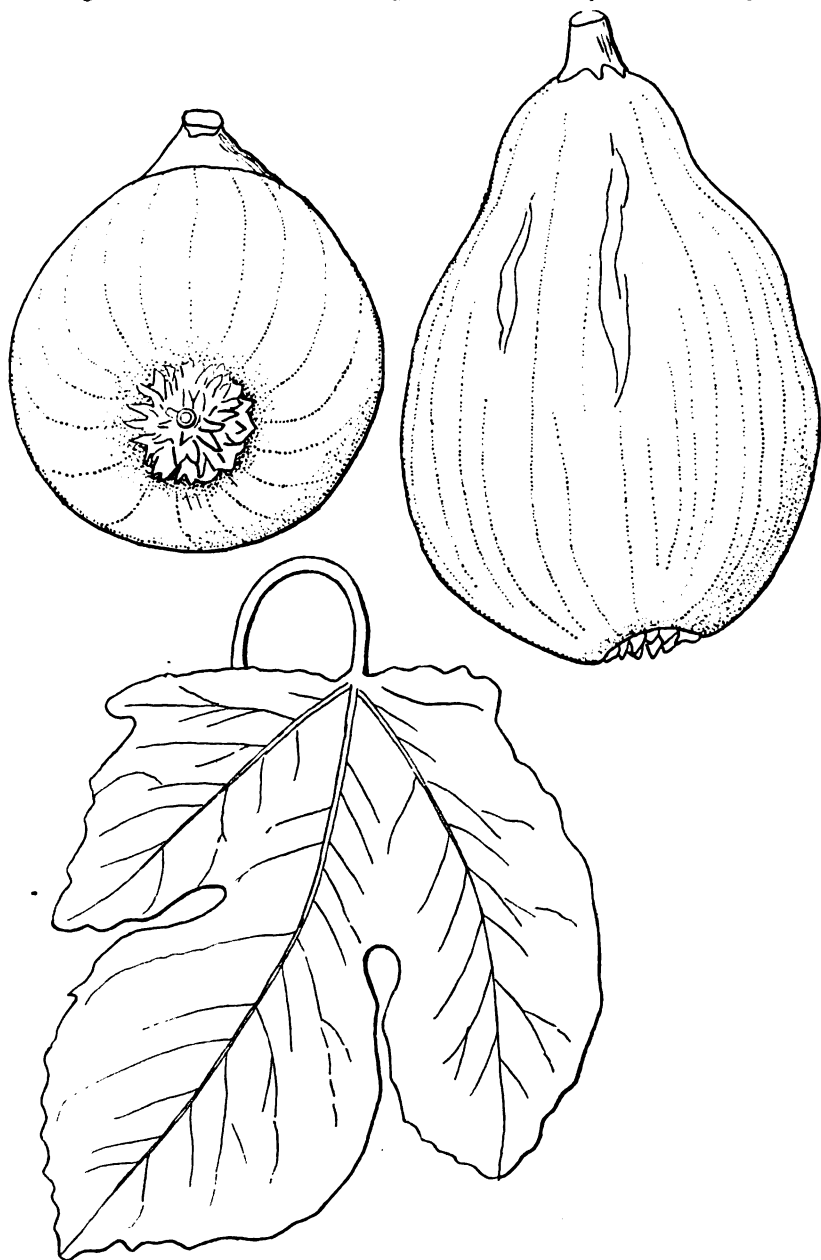


FIG. 6.—Gentile fig.

names. Local names are given everywhere, and as no systematic descriptions of all the various varieties have ever been published, no

efforts have ever been made to identify and classify them. The most common fig used for drying is the Dottati, Datterese, or Dattero, the "figue datte" of France, the date-fig of the English, so called on account of its sweetness and the readiness with which it dries. The Dattero is the drying fig for the Calabrias and the south of Italy generally. The size of the fig is below medium; color is light, and so is the pulp. The color of this fig is equal to that of Smyrna figs. The Petrogiano is another drying fig used in the province of Catanzaro, but not equal to the former.

The figs commonly eaten in Italy are legion, but the best is considered the Trojano, principally grown in the vicinity of Naples. The "fico di fragola," or strawberry fig, is a favorite in Sicily, while in the north, in Toscana and Umbria, the "Verdini," the "Brogiotto neri" and "Brogiotto bianchi," the "Fico Gentile," (see fig. 6), and the "Portoghese" are the varieties mostly cultivated. The San Piero, Black and White, are among the largest early figs in central Italy, but are little known in the south. This fig, which produces only first-crop figs, or "fichi fiori," is replaced in the south by the "Colombro" and "Paradiso," which also give excellent figs.

CAPRIFICATION.

Caprification is practiced only in southern Italy, and not everywhere in this locality. Most of the Italian varieties do not require caprification, and, so far as I know, none of the true Smyrna figs—with only perfect flowers—is grown in Italy. As localities where caprification is especially practiced there may be mentioned Sicily, Catanzaro, the old Kingdom of Naples, Ischia, etc.; also the islands of Lipari and Malta.

The total annual output of Italy in dried figs shipped to various countries reaches about 18,000,000 pounds in favorable years, while in years of smaller crops it may fall to 9,000,000 pounds.

FIGS IN PORTUGAL.

The country around Lisbon and farther south is well adapted to the fig industry, and fig trees grow everywhere. The late Dr. John Bleasdale, who was familiar with Portugal, considered the country surrounding Lisbon for 20 miles as especially favorable for figs, the large white figs being most appreciated. But the figs raised in the vicinity of the capital, though large and sweet, are not the best for drying and export; they are consumed principally at home, whether fresh or dry. With the increase in temperature toward the south the fig improves in quality and the conditions become more favorable for drying with the least amount of labor. Accordingly we find in the most southern province—Algarve—the real home of the fig industry on Portuguese soil. Few countries in any part of the world are as well favored with regard to climatic conditions as this

famous province, and, with the single exception of Smyrna, or rather the valley of the Meander River, no locality in the world produces figs of quality equal to the Algarve figs. The province of Algarve is an open littoral, gradually rising from the beach toward a high chain of mountains, which, with an easterly and westerly trend, shut off the northern winds. The exposure is toward the south alone, the heat being moderated by the balmy Atlantic breezes. What Andalusia is to Spain, Algarve is to Portugal—the orchard, garden, and granary of that Kingdom. The deep alluvial soil is one that contains much lime and naturally retentive of moisture. The temperature of the province is remarkable for its even distribution, with only slight variation day and night, spring, summer, and fall. The mean summer temperature is about 79° F., and this mean lasts from May to November. The highest is in August and September, with 82° F.; the lowest in May and November, with 77° F. The moisture of the air is considerable, or about 73° for the summer months of May to November. Compared with California localities, none are exactly similar; but El Cajon, one of the interior valleys in San Diego County, comes the nearest. Compared with the large interior valley of California the moisture in Algarve is much greater, being about 70°, while in the San Joaquin Valley it is below 50° during the same summer months.

The fig in Algarve grows to great perfection, and it is found everywhere from the seashore to an altitude of about 1,100 feet. In fact, the principal product of the district, whether we consider quantity or value, is figs. But besides figs the country produces oranges, almonds, olive oil, and wine. The country is only partially cultivated, the improvements rarely extending farther inland than 6 miles from the coast line.

Not many years ago the figs of Portugal were the most famous in the world, or at least the best known in western Europe. In the early part of the last century Portugal supplied England, America, Germany, and the north and west of Europe, generally, with figs, but was later on driven from the market by the superior and better-managed product of Smyrna. The Portuguese figs were known as Faro figs, because they were exported from Faro, in Algarve. For a long time Faro was the principal business place in southern Portugal and, as such, also the export place for figs. The figs which were grown in the vicinity on the rather sandy plains and in the foothills of Sierra San Miguel were naturally of very good quality or almost of the very best quality, but they were very badly handled in drying and curing and only commanded the foreign market until a better article was offered. The peasants generally carried the figs fresh or partly dried to the city and sold them as such to the merchants, who again dumped them out in small heaps on the stone floors in the warehouse. Maltreated in this way the figs were usually bruised and a large part of

the sirup ran out and collected in narrow gutters and finally fermented in tanks. After fermentation of the surplus fig juice a kind of brandy of very good quality was distilled. The figs were again spread on stone or cane floors in the open courts and gardens and exposed to the sun for a longer or shorter time, according to the weather. When dry the figs were pressed into small baskets made of braided palm leaves, each basket holding 28 pounds. The number of varieties of figs grown in Portugal is very great. The fig used for drying in Algarve is a large, white fig different from the Smyrna figs, so far as may be judged from descriptions. The best variety in Portugal is known as the "figo da Comadre," or Godmother fig, so named because the best is always reserved for the comadre and the compadre, words hardly to be translated into English, but which play a great part in the home life of the Latin races.

The next best variety when dried is known as "figo mercante," while the third and poorest kind goes under the name of "figo chocho."

Of these figs large quantities are yet exported, principally to Belgium, Holland, and France. The annual export averages 8,000 tons, or about one-half that of Italy.

The first crop, the *fiori* or the *brebas*, is known in Portugal as "figos lampas," while the second crop is called "figos vendimos." For table use the red-fig varieties are considered the best. In the vicinity of Faro the "figo do euchariao" and the "do bispo" are the most valued varieties. The *Lampeira* is one of the best red figs, producing only a first crop, called the *lampas*. In Italy this fig is known as the *Portoghese*, and is considered a very good early fig, somewhat like the *San Pedro*. As regards culture and curing little is to be learned from the Portuguese. For cutting the figs from the trees a long bamboo pole is used, the end being split or forked. Below the fork a small basket of braided straw is hung to receive the falling fig, which is easily detached by pushing the fork upward. Only the best figs—a comparatively small proportion of the crop—are dried. This drying is on mats woven of the *esparto* grass (*Stipa tenacissima*). As a result of the poor handling of the fig, this industry has decreased greatly in recent years. Portuguese table figs, which were once the staple article of figs in the western world, are now hardly known outside of Portugal, the carefully cured and beautifully packed Smyrna figs having driven the Portuguese article almost out of the market.

The glory of Faro, as regards figs at least, is past. The harbor has become much filled in, and few figs are now sent abroad from this port. The trade in figs, on a much diminished scale, has been almost completely transferred to the better and more readily accessible port of Villa Nova do Portimão. Fig culture and curing have of late progressed but little in Portugal. Curing and packing, as practiced in Smyrna, are entirely unknown. When the Portuguese figs were refused by the foreign trade the cultivators and merchants did not

inquire into the cause and made no effort toward improvement. The consequence has been a ruined business, which is not likely to revive soon. With proper care the Portuguese figs would really be very good, almost equaling the Smyrna figs.

CAPRIFICATION.

Caprification is practiced everywhere in Portugal. The caprifig is known as "figo di toca," the name not being derived from "tocar," to touch, as indicated by Link and other writers, but from the Arabic word "tokkar" or "dokkar" (the wild fig), showing that caprification was introduced, or at least reintroduced, by the Arabs or Moors. This caprifig belongs to the type with broad leaves. The caprifig, or figo di toca, ripens its first crop in Algarve at the end of June or beginning of July, and a later crop setting at this time becomes ripe in August. The process of caprification is the same as in other countries and deserves no special mention here. The Portuguese fig growers know that not all fig varieties require caprification, and that in some varieties the first crop may not require caprification, while the second crop does require it. The Lampeira, which is grown principally around Tavira, belongs to the class which requires caprification for its second crop, but which matures a first crop without it. The first crop or camada of the Lampeira is also called "figos lampas" and is never caprificated. The second crop or camada of the Lampeira, known as "figos vendimos," is said to never set and mature except with caprification, which accordingly is always practiced. "Figo euchariao," which also requires caprification, ripens only one crop, in September. The "figo bravo," which is cultivated along the River Guadiana, gives also only one crop, which does not require the figo di toca, and accordingly is never caprificated.

The annual export of Portugal is about 16,000,000 pounds.

FIG CULTURE IN FRANCE.

FAVORABLE LOCALITIES.

In France profitable fig culture extends from the environments of Paris to the shores of the Mediterranean. While in the north figs are grown for use only while fresh, in the south they are also dried for export and home consumption. Provence is the center of the fig industry in France. There the climate is mild and favorable for olives, figs, pomegranates, and to some extent also for citrus fruits, but on the whole the favorable conditions for the fig industry are not equal to those in southern Italy and Sicily. In winter the frosts are sometimes severe enough to greatly injure the fig trees, but their recuperative nature is such as to readily renew the injured parts. As in all the Mediterranean region, the rains are frequent in winter, few or none during the summer months. Irrigation is frequently resorted

to and is not considered injurious if judiciously applied. Figs destined for drying are irrigated less than those for use in the fresh state.

In the most favored localities the fig trees are planted 18 to 20 feet apart and smaller crops are grown between; but on account of the fungus which frequently and fatally attacks the roots of the figs and rapidly spreads from one tree to another where they are growing so close that the roots interfere with one another, most fig trees are alternated with almonds or olives.

The closer to the Mediterranean the taller are the standards or trunks of the fig trees, and the farther away from those shores the less the trunks, both in height and circumference, until in the vicinity of Paris the trunks disappear entirely and give way to a cluster of branches issuing direct from the soil.

The trees with high standards suffer most from heat and dryness; consequently high-standard fig trees are found only in localities where irrigation is practiced. After the tree has been planted, generally from a cutting, it is allowed to grow as it pleases for two years. The effect is the development of numerous suckers from the base. In March of the third season the largest of these is selected to form the future standard, while the others are cut away. On this standard all side branches are cut until it has reached a height of 2.30 meters, or about 7 feet. The top bud is then pinched in the spring and side branches are allowed to form immediately below, constituting the coming head or crown of the tree.

Pruning is very little practiced, although in some localities fig trees are pruned to some extent. Suckers are removed from the base; dry branches as well as branches which cross one another are cut away, and branches which bend too close to the ground, interfering with other crops, are cut off. But the general rule is that the less the fig tree is cut the better for the tree. Whatever pruning is required is done in March or April. The cultivation of crops between the trees also suffices for the figs. Where no irrigation is practiced a hollow basin of earth is formed around the base of the fig tree early in the fall in order to catch the winter rains. In exposed localities the trees are protected in the following manner: In the middle of December or the beginning of winter the space around the tree is dug up and the soil heaped around the stem as high as possible in order to protect it from cold. In the beginning of April this earth is again leveled down and the soil dug up anew. The succeeding labors are confined to irrigating the trees once a month until the end of August, when the harvest of the figs begins.

It has been found that manuring greatly improves the figs. Light soils are manured with cow dung every two or three years, while for heavier soils sheep, horse, and pigeon dung are used every six or eight years. But the best manures for figs are offal from factories, such as wool waste from mills, as well as bone dust.

In southern France or Provence the following localities are especially renowned for their figs, fresh or dry, and in their vicinity may be found large plantations of figs: Aix, Salon, Marseilles, Brignoles, Toulon, Grasse, Antibes, St. Remi, Entrecasteux, Bandol, Seyene, Tarascon, Nice, Bordeaux, Treves, Hyères, St. Tropez, St. Maximin.

CURING THE FIGS.

When the figs are perfectly ripe they are picked early in the morning, after the dew has dried off. There are at least two ways of curing the figs in France. In the first method the figs are simply placed on trays made of wicker willows, exposed to the sun, and turned every morning and every noon.

The other process consists in dumping the figs into boxes after they have been exposed for two or three days and then allowing them to go through a sweat for forty-eight hours. After that time they are again exposed and the drying is finished in the sun. At the approach of showers the trays are stacked and covered with waterproof canvas. Every morning the dried figs are taken out. When all are dried they are separated into three different sizes. Ovens are used for inferior figs only.

PRINCIPAL FIG VARIETIES GROWN IN SOUTHERN FRANCE.

The following are the principal varieties of figs grown in southern France:

White varieties.

Napolitain, second crop; ripens in September; fresh and dry. At Aix and Salon.
 Verdale; fresh and dry; ripens in September. At Brignoles and Salon.
 Bourdisotte blanche; fresh and dry; ripens in September. At Marseilles.
 Aubique blanche; for drying only.
 Ragusa; ripens in the middle of September. At Marseilles.
 Hospitalier; for drying; ripens in the beginning of September. At Salon.
 Doucette; fresh and dry; end of August. At Salon.
 Messongue; fresh and dry. At Salerne.
 Bontilete; for drying. At Brignoles.
 Marseillaise, figue d'Athènes; for drying only; end of August. At Marseilles and Toulon.
 Seyroles; for drying. At Grasse and Draguignan.
 Versailles; fresh; middle of July.
 Pissalutto; fresh and dry. At Grasse.
 Peconjudo; fresh and dry. At Grasse and Antibes.
 Cougourdane. At Aix and St. Remi.
 Tibourenque; fresh and dry; middle of September. At Marseilles and Salon.
 Col de Signora; fresh. At Ronsillon.
 Beaucaire; for drying. At Entrecasteaux.
 Blanquette; only for drying in localities where other drying figs will not do well.

Colored varieties.

Quasse blanche; for drying; end of August. At Bandol and La Seyne.
 Figue-datte (Dattero-Italy); fresh and dry; end of August. At Salon and Eyguieres.

Poulette; fresh or dry; end of August. At Tarascon and Salon.
 Cotignano; first crop middle of July; fresh; very extensively cultivated.
 Mahonnaise; fresh; middle of September. At St. Remi.
 Cuer; fresh and dry; middle of September.
 De Saint-Esprit; first crop fresh; end of June. At Marseilles, Aix, and Salon.
 Matarassa; for drying only; end of August. At Grasse.
 Rose blanche; for drying only; middle of September.
 Safranée; fresh and dry; middle of September. At Nice and Salon.
 Franche Paillard; first crop only; fresh.
 Aubique violette; fresh only.
 Bellona; fresh and dry; very fine. At Grasse, Marseilles, and Draguignan.
 Courcourela; for drying only. At Grasse.
 Beaucaire; for drying only. At Grasse and Hyères.
 Grosse Beurdoa; fresh and dry. At Grasse and Saint-Tropez.

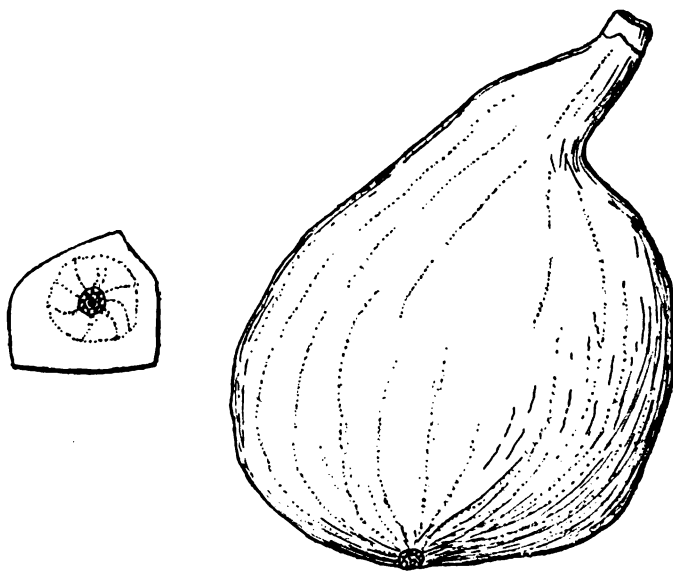


FIG. 7.—Ronde Noire fig.

Black varieties.

De Porto; fresh and dry. At Seyne and St. Maximin.
 Barnissotte; fresh only; September and October.
 Bernissenca; a later form of Bourjasotte noire; fresh only.
 Mouissonna; fresh and dry; one of the best figs of southern France.
 Sultane; fresh. At Salon.
 Perruquier; first crop; only good; fresh; end of June.
 The best figs for drying in southern France are: Marseilles, Grassenque, and Mouissonne. Farther north near Orange the varieties mostly used for drying are the Blanquette and Verdale.

The earliest variety for table use in southern France is the Observantine and the latest are Bourjasotte noire and Mouissonne violette.

NORTHERN AND CENTRAL FRANCE.

In the vicinity of Paris fig culture rises to a prominent horticultural industry in at least two localities—at Argenteuil and at Frette. Through care and ingenuity most excellent figs are raised there in the open ground and under a climate not naturally adapted to the fig. During three hundred years Argenteuil has supplied Paris with fresh figs, and fig culture in that locality has reached a scientific development not known elsewhere. The methods followed there are superior to any employed elsewhere in similar or higher latitudes and produce better results than figs grown against walls and protected by mattings during the winter months. If the methods of Argenteuil and Frette were adopted in the United States fig culture would prove profitable even in a number of places in the vicinity of many of the large cities east of the Rocky Mountains, where there is always a market for choice fruit. In the hope that such a culture will soon spring up a minute description is given of the processes used for perfecting or, as they call it, for “educating” the figs in Argenteuil.

LOCALITY AND CONDITION.

The best place for a fig orchard is a warm exposure toward the south, sheltered as far as possible from heavy winds, as the latter destroy the fruit irreparably. Locations free from spring frosts are, of course, to be preferred; in fact they should be the only ones selected, as late frosts retard the maturing of the figs and may even entirely spoil the crop. Argenteuil and Frette are favorably situated, but still they suffer from frosts in February and March almost every year. The best soil is calcareous loam of great depth and warmth.

HOW TO START THE TREES.

The fig plantations are generally started from trees. These again are grown from cuttings about 16 inches long, taken in February or March or as soon as the branches are disinterred. These are planted in nursery, leaving only two eyes above the ground. In November these cuttings will have obtained good roots, and as the leaves will then have fallen with the first frosts, the cuttings may be taken up and used for immediate planting. In case planting shall be delayed until the following spring it will be necessary to cover the rooted cuttings in a way similar to that done by the trees, the process of which will be described presently.

FORMING THE ORCHARD.

The trees are planted either singly or in rows, squares, or quincunx, about 9 to 10 feet apart. No large plantations exist, as the great labor and care necessary for success would make supervision of large orchards impossible. The holes for the trees are dug about 3 feet square and about 2 feet deep. One or two trees are planted in every hole. When two trees are set in one hole this is done not only in

order to quickly get many fruit-bearing branches, but also to cause the trunks to bend readily to the ground. If two are set they are planted 1 foot apart and in the general line of the row. The depth is regulated according to the size of the trees. All the old wood should be buried below the surface and only the season's wood exposed above. The trees are not set perpendicularly, but must be slanting or oblique with the surface, in order to facilitate the future bending of the trees. If the ground is level the two trees should form an obtuse angle with each other and a sharp angle with the surface; in other words, bend in opposite directions. If the surface is inclined, then both the trees should be slanting upward, in order that both may be equally well buried. After planting each tree is cut back to two eyes. If the planting has been done in November the young trees must be covered over with 1 or 2 feet of soil. At the end of February or the beginning of March this soil is removed and the ground worked over. Around each tree is made a basin about 8 to 12 inches deep and 2 or 3 feet in diameter, to hold the rain water or the artificial watering during the season. Thus planted, the trees are left to themselves for the season. In the following November, after all the leaves have fallen, the soil is dug away from the tree to a depth of 10 inches, especially immediately below the principal branches. These are then carefully bent down into the trenches and covered with about 14 inches of soil, the surface of which must be made convex, in order to shed the water. It is also important that no leaves, immature figs, grass, straw, or any other matter which possibly could decay should be left in the soil near the branches, as it would cause the latter to rot. If the branches do not readily remain in the ground they may be kept there with a bent peg similar to the pegs used in rooting layers. In February, as soon as the frosts are over, the soil is taken away. The strongest branches are pruned back to two or three eyes, while the weakly ones are removed entirely. It must be the endeavor to give to each fig bunch from 14 to 16 branches, but this may be done gradually if good branches are not had the first or second season. The second season is devoted to forming these branches, the strong ones being encouraged, while the weak ones are cut away.

The third season after the branches have been disinterred in February or March, the same pruning back to two or three eyes of last season's wood is practiced. In fact, all the operations of the preceding season are repeated, the cultivator so selecting his branches that the tree, or rather bush, will spread evenly in all directions, so that the branches will not interfere with one another.

PINCHING THE TERMINAL BUDS.

In the fourth season the fig trees or bushes begin to bear. The branches should not be disinterred until all the frost is over. But as late disinterring will cause corresponding late maturity, many

growers disinter half of the trees at the end of February and the other half at the end of March, which secures them at least a partial crop. As soon as the branches are out of the soil the terminal buds on all the side branches which are to bear fruit are removed by pinching, either by hand or by shears. The fruit-bearing branches will at this time show the young figs alongside the leaf bud. All branches intended to bear the following season are pruned back to two or four eyes. The skill and experience of the cultivator is here exercised in the selection of the proper branches.

REMOVING THE SIDE BUDS.

A few days after the last operation, designed to push the side buds and the figs, another operation takes place, which consists in suppressing or removing the side buds. On every side branch about one-half or more of the leaf buds are removed, but one or two eyes closest to the base should always be left to form fruit branches for the next year. One bud is also left higher up on the branch. On the Blanquette variety this operation is performed as soon as the buds show signs of starting—on the Dauphine Violette only when they have attained three small leaves. Care should be taken that the young figs are not injured or even touched. If they are, they will not come to maturity. The two lowest buds are preserved to form fruit-bearing branches for another year, and the upper bud is left to draw sap.

The terminal branches are similarly treated, with the difference, however, that the terminal bud is left, with two others lower down, to form future fruit branches, at a distance from each other of about 12 inches. A few days or weeks later, or when the remaining buds have grown out and formed small branches or spurs 2 or 3 inches in length, with a few leaves, they are cut from all lateral fruit branches, care being taken to leave one of the lowest as near the base as possible. The object in not removing them at once is to prevent the tree from being shocked and set back. After the last operation the branches will present this appearance: The terminal branches will have the terminal bud growing, with two more at equal distances lower down the stem; the side branches will have only one of the lowest buds growing and one near the top, which latter, however, should never be allowed to assume more than five leaves, which are sufficient to draw the sap; but in preserving these buds and branches it is important that only those on the outer or lateral surfaces of the branch be preserved. The interior buds, if allowed to grow out, would be very difficult to cover with soil in winter.

CARE DURING THE GROWING SEASON.

After the buds have been removed the branches should be carefully arranged in such a way that they will touch one another as little as possible. This is accomplished by the aid of crotches or pegs, which

are set in the ground to hold the branches apart. All leaves which in any way touch the figs should be removed, as they bruise the fruit and spoil its appearance.

At the maturing of the fruit it often happens, especially with the Dauphine variety, that the fruit is too near the soil. The branches must then be somewhat elevated with studs or the fruit will spoil; but in no case must the elevation be such as to raise the branches in an upright position—merely enough to bring the fruit above the ground. If raised too high the fruit will not ripen. In order to guard against spring frost the fig bushes are covered with light mattings early in the morning or in the evening when danger of frost is apparent. Another method is to create smoke by burning tar, straw, and damp wood an hour before and after sunrise.

PRUNING BEARING FIG TREES.

The first ripe figs are picked at the end of July, the last at the end of August. As soon as the last figs are harvested the fig trees are pruned. This operation consists in removing the wood which bore the figs just harvested, while the wood is cut close to the branch immediately below. The dead wood is then removed, as well as useless suckers, and all which are not destined to produce fruit-bearing branches in coming years. The branches which are to bear the next season's crop are not pruned, as such proceeding would ruin the crop. The next season, after the trees are disinterred, the process of pinching the terminal and secondary buds is again gone through with, after which time no new treatment is required; but after the branches have reached a length of 6 to 10 feet they are too long to be practically handled and covered and must then be removed, not all at once, but gradually, a few a year, and new suckers allowed to take their place.

In covering the branches after the trees have begun to bear it will be best to tie them in small bundles, 4, 6, or 8, according to the size of the tree. As a result of being covered yearly these branches never regain their natural vertical direction, but lean more or less horizontally. This also hastens the maturity of the fruit and is an element of success in the growing of figs in cold regions. Previous to covering the branches all leaves and figs should be removed, as they cause decay.

COVERING THE TREES.

Every year, in November, the fig trees must be interred in the soil in a way similar to that already described for the cuttings. This, of course, is the chief work of the season, and entails as much labor as almost all other operations combined. If the trees have been planted slanting properly the difficulty of bending the branches is not great. On level ground the trenches should run in every direction from the root, but on sloping ground they should always run up the hill or somewhat sideways.

In covering the trees care should be taken to make the trenches as nearly horizontal as possible and not less than a foot deep, and to raise the soil sufficiently above to insure against both cold and damp. The center of the tree should be covered more deeply, and a small hill, several inches high, should in winter designate the place where the roots go down. This is necessary to shed the water and protect the roots from excess of moisture. In removing the soil the next February or March a cloudy day should be chosen, the afternoon of a rainy or cloudy day being best. If disinterred in bright and warm sunshine the change is too great and the trees may suffer from being scorched by the sun.

OILING THE FIGS.

In southern France—in Argenteuil and in Frette—a process is performed called “*apprêter les figes*” or hastening the figs. In Argenteuil and in Frette it is employed on all the figs which are desired to ripen early, the proper time for this process being of the utmost importance. If done too early the figs will not ripen at all, but will dry and spoil. The proper time is when the fig begins to color and the skin begins to feel soft, or about seventeen days before it would regularly mature if left alone. Toward evening, if possible, a single drop of good olive oil is placed on the eye of the fig, care being taken not to spread the oil. The oil is placed on the eye by means of a wheat straw and in such a way as to touch only the center of the eye. The next day the fig shows a change and in nine or ten days it may be cut, perfectly ripe, the operation having hastened the ripening of the fig certainly from six to eight days. Such treated figs are also better, sweeter, and with smaller seeds than those which have not been oiled.

VARIETIES AND CROPS.

As before stated, only the first-crop figs come to maturity in that part of northern France under consideration, and only fig varieties which produce such figs are grown. The one most generally grown in Argenteuil is the *Blanquette*; at Frette the *Dauphine Violette*, a later but better variety, is the favorite. The *Rouge de la Frette* and the *Observantine* are also cultivated to a limited extent.

In Argenteuil alone 200 acres are devoted to figs. In Frette very many less. The value of the crop in Argenteuil, in 1884, was 100,000 francs.

Along the coast of Brittany, principally at Croisic and Cherbourg, fig culture is quite extensive, the mild coast climate being much more favorable to the fig tree than that of the interior of central France. Strangely enough, the varieties most cultivated are one with perfectly developed male flowers and another with degenerate male flowers. On the Channel Islands the fig tree assumes the shape and size of a small tree and requires no protection during the winter.

POINTS OF SUCCESSFUL CULTIVATION.

The following are the essential points in successful fig culture in the open air in all northern districts where the climate is too rigorous to allow standards:

(1) Inclining the trees when planting in order to facilitate the yearly interment of the trees.

(2) Semihorizontal position of the branches, in order that they may catch as much air and heat as possible; otherwise the fruit will not ripen.

(3) The consequential dwarfing of the trees and total absence of a trunk or standard above the ground.

(4) The yearly practices of procuring and forcing fruit branches and fruit, which consists in pinching the terminal buds, suppressing the lateral buds; removing the fruiting branches as soon as the crop is harvested; preparing new fruit-bearing branches for the next season; these should always be situated as close to the main stems as possible, etc.

(5) The yearly interment of the branches, which necessitates the previous removal of all leaves, figs, and dead wood.

(6) The subsequent disinterment of the branches, which is always to be done in cloudy or rainy weather, in order that the change may not be too sudden.

(7) The renewal of the main branches every twelve to fifteen years, as by that time they begin to be too old and too stiff to cover in winter.

PRODUCTION.

While France exports considerable quantities of figs, its imports are much larger. The following table gives an idea of the trade for five years:

Year.	Imports.	Exports.
	<i>Kilograms.</i>	<i>Kilograms.</i>
1887.....	18,600,000	587,800
1888.....	12,642,000	834,341
1889.....	13,100,000	941,893
1890.....	16,502,000	967,580
1891.....	14,053,000	413,300

The principal consumers of French dried figs are Belgium and Switzerland. The countries which supply France are Turkey, Italy, Spain, Portugal, and Greece.

FIG CULTURE IN ENGLAND.

Fig culture in England dates back several hundred years. It is more than probable that the first figs were introduced by the Romans, but that the trees died out from want of care and knowledge after the Romans had left the country. Plantations were confined to the southern countries and were probably never generally cultivated. In the reign of Henry VIII the fig was again introduced, it is said, by Cardinal Pole, who brought the trees from Italy. Hortus Kewensis tells of fig trees being planted in England in 1548, and Gerard says in 1597 that the fruit of the fig tree "never cometh to maturity with

us except the tree be planted under a hot wall." In 1629 Parkinson said: "If you plant it not against a brick wall, it will not ripen so kindly." And later on, in 1640, the same author says, in *Theatrum Botanicum*: "The bleu figge is no doubt of the same operation with the white to all purposes, but the fruit commeth most to maturity with us, and is eaten with great pleasure with salt and pepper." After the middle of the seventeenth century we may consider fig culture well established in England. As late as 1822 a tree was seen in the botanical garden of regius professor of Hebrew in Oxford University. The tree was planted by Dr. Pocock in 1622, and must have then been nearly 200 years old. In the eighteenth century the fig orchards of Tarring, near Worthing, in Sussex, were famous and proved very profitable. These orchards were grown as standards, and the crowns of the trees were said to have been 40 feet in diameter. They seldom ripened more than the first crop. In the beginning of the last century some of these Farring trees were 40 feet high and ripened two crops a year. In our day fig trees are quite common in gardens in the southern countries of England and grown principally against walls. The first crop is always the one which is depended upon, the second crop being generally too late to ripen. The trees are not pruned where the culture is properly understood. By far the greatest number of fig trees are grown in England under glass, or at least under winter covering, and a large number of varieties has been imported from foreign countries. Under glass both crops come to maturity. For outdoor cultivation the favorites, as being the most hardy, are Brown Turkey and Brunswick. Dr. Hogg, who is the English authority on figs, recommends the following varieties for English gardens:

- (1) For standards: Black Ischia, Brown Ischia, Brown Turkey.
- (2) For walls: Black Genoa, Black Ischia, Brown Ischia, Brown Turkey, Brunswick, Castle Kennedy, White Marseillaise.
- (3) For forcing in pots: Angelique, Black Ischia, Brown Ischia, Early Violet, Negro Largo, Pregussata, White Ischia, White Marseillaise.

The Frette and Argenteuil methods described elsewhere are not adopted in England. Of course all figs grown in England, either outdoors or in pots, are consumed fresh and bring a good price in the market. In England an immense number of fig trees is grown in pots in storehouses, and such culture has been most profitable, as well as insuring a continuous crop of figs for many months in the year. The most convenient sizes of pots are those of 12 to 15 inches for fruiting trees, but smaller pots may also answer. While at rest the pots are kept in cool houses free from frost. The best soil for pots consists of three-fourths sandy loam, the balance mortar crushed fine. Repotting is done in October, just before the leaves fall. The soil should be moderately rich, liquid manure being applied when required.

When starting in the spring a temperature of 50° should first be given, later increased to 60°. Give as much sun as possible and keep the air moist. It is a mistake to keep the air very dry. Fresh air should be given when the temperature outside reaches 75°, and the inner temperature should then be brought up to 95° or 100°.

A single standard is best. When the new shoots reach 6 inches they should be pinched back and checked. By a successive pinching of respective shoots a successive crop of figs may be had.

Weak growth should be cut off and thinned out close to the stem to prevent shading. During fruiting the air should be kept much drier and the temperature should be even. Any check in the growth of the trees during fruiting time may cause the figs to fall before maturity. The most favored varieties and those most readily grown in pots are Brown Turkey, Negro Largo, Violette Sepor, and St. Johns.

Imports of figs to the United Kingdom.

	Pounds.		Pounds.
1876	16,316,300	1882	7,357,800
1877	9,691,000	1883	12,343,400
1878	6,724,300	1884	13,189,600
1879	10,532,700	1885	11,316,200
1880	8,591,300	1886	11,425,300
1881	13,822,500		

The import of dried figs to Great Britain now averages yearly about 200,000 hundredweight. The greatest quantity, or about 15,000,000 pounds, comes from Italy; Spain furnishes about 5,000 pounds; Portugal, Greece, and Turkey, small quantities.

FIG CULTURE IN SPAIN.

The production of figs in Spain is enormous and large quantities are exported to France, Austria, etc., principally for distilling. In 1882, 1,100 packages or mats of dried figs were exported from Malaga to the United States. In 1800 this district produced 16,000 quintals, which in 1823 had risen to 20,000 quintals.

Cuttings are planted slanting, and grafting is done in April, while the eye is yet dormant, but after the sap has started flowing.

The following are some of the most favored varieties in the vicinity of Valencia:

- (1) *Gombaya*.—Rose to bright rose; stem of tree blackish; requires moist soils.
- (2) *Burjasot*.—One of the best figs in Spain, as well as in the Mediterranean generally. Fruit black, round, and flat at apex. Tree with weeping branches.
- (3) *Verdal and Gironnetta*.—Small, green figs, round, very sweet. Skin thick and hard, of bright green color; pulp red.
- (4) *Palopal and Napolitan*.—Fruit very large and fine.

FIG CULTURE IN THE SOUTHERN STATES OF NORTH AMERICA.

While the fig tree grows and bears well in the Southern and Gulf States of the United States of America, it is not raised there as a commercial product, except on a very limited scale. The cause must be sought in the climate of the region, so unlike that found in the Mediterranean districts. While in the latter the winters are mild, with few frosts and rainless summers, the Southern States are frequently visited by heavy winter or spring frosts, the summers being more or less rainy. In the winter the trees are often killed or seriously injured by frost, while in the wet summers the figs rot and mold, and drying out of doors is made difficult.

In favorable seasons only do the figs attain a certain perfection in maturity and sweetness and are then very good and palatable. Even in such season drying and curing out of doors is not attended with success. As a consequence no large fig plantations exist in these States, the tree being principally grown for home use. In such capacity it is found everywhere, especially toward the extreme south, along the Gulf of Mexico. While the fig may not be profitably grown in the Southern States, if the object is to prepare them by drying for the markets, it is nevertheless certain that fig culture may there be made profitable. For canning, making jams, jellies, fig sauce, and other fig preserves, the fig of the Southern States may be made available with little expense or difficulty. Of late years a most delicious preserve is made from the Celeste fig. It is being extensively placed on the market in the form of canned goods, and is considered by some persons as superior to any put up for commercial purposes in any of the Pacific States. In Louisiana and in parts of Texas the fig does well and requires no especial care in cultivation. In the pine lands of Mississippi, Alabama, Georgia, Florida, and South Carolina they require more attention in the way of fertilizing to produce favorable crops. Of late years Florida fruit growers have given considerable attention to fig growing, but the results have not yet been such as to warrant extended plantations. The rainy summers are the principal drawback to the perfect ripening of the fruit.

GEORGIA.

In the Gulf region, especially near the coast, many varieties do exceedingly well and produce very delicious figs, but of a regular fig industry there is no trace. In time it may come. The following account is from letters received from Mr. P. J. Berckmans, of Augusta, Ga. It plainly shows that very much remains to be done for fig culture in that vicinity:

Here we cultivate with success Brown Turkey, Celestial, Green Ischia, Black Ischia, and Brunswick. These are, all things considered, the most desirable kinds and are usually found under cultivation. I have some 20 varieties, of which some are occasionally successful, but not as reliable as those named above. Of this class I name: Blue Genoa, good but not prolific; Violette Ronde and Violette Longue, both of fair quality, but unproductive and apt to crack before maturity.

Angelique or Coucourelle Blanche, small, of poor quality; Marseilles Blanche, not productive; Nerii, very good but very unproductive, except in the immediate sea-coast belt; Pregussata, very good, but a shy bearer; Black Havana, very prolific and of good quality, but tender; San Pedro and White Adriatic are regularly winter killed here and are undesirable even in Florida; White Four Seasons, very dry and inferior, but prolific; Madeleine Blanche, unproductive; Jaune Hative is very similar to Angelique; Lemon (probably White Genoa), excellent but unproductive here; succeeds well on the coast; Rouge Longue de Provence, of second quality, unproductive; Superfinede la Saussaye; this I believe to be the same as Violette Longue; White Smyrna—we have three varieties under this name, all inferior, and we can not arrive at a correct nomenclature.

The following description of the curing of the fig in Georgia is given by one of the growers there:

Gather the figs when the skin begins to crack (this is a sign of maturity and the fruit then contains the largest amount of saccharine matter). Make a strong lye of oak ashes, or take common cooking soda dissolved in hot water. Dip the figs in the hot liquid, leaving them there for only a few seconds; expose immediately to the air for a minute or two and repeat the dipping a second time. If the lye is hot and strong enough the color of the fig will immediately change, the dark-skinned varieties to a dark green, and the light-colored varieties to a pale green. The object of dipping the fresh figs in hot lye or a solution of bicarbonate of soda is to kill the milky juice and thus hasten the drying. A basket loosely made so as to allow the liquid to come freely in contact with the fruit is always desirable for use in dipping. Place the figs upon trays made of wooden slats and expose fully to the sun, taking the fruit under cover every evening, as it will spoil if the dews fall upon it. The fruit must be turned in the sun every day, and in three to four days it will be ready to put away in small wooden boxes, putting a layer of spice laurel leaves (*Laurus nobilis*) at the bottom and covering the top with another layer of these leaves. Place the lid on tightly to keep insects out, and keep in a dry room. If a brick oven is convenient it will facilitate the work and hasten the drying, but care must be taken not to give too much heat. If the fruit secretes sirup it has been put under too high degree of heat, and the result will be an inferior article. After the fruit is partially dried it should be lightly pressed by the hand to flatten it. Light-colored varieties are the best for drying, but the Celestial and Brown Turkey are much richer in quality, although presenting a darker and less attractive appearance.

The Celestial dries the most readily of all our varieties, but makes the least valuable article as regards quality. The Brunswick, being very large, seldom gives good results with ordinary means, but will doubtless be easily managed with improved drying apparatus.

The figs generally grown in the Southern States are the Celestial, Brunswick, Ischia, Brown Turkey, and half a dozen more varieties with local and uncertain names.

FIG CULTURE IN MEXICO.

BAJA CALIFORNIA AND SONORA.

These two States of Mexico are well adapted to fig culture, especially the former. In Baja California the fig crop not only furnishes considerable food, but a considerable amount is exported to the other States of Mexico, though as far as known none go elsewhere. The

figs, which are black and of the Mission variety, are grown principally in the central portion of the peninsula, from Purisima and Comondu to La Paz. Irrigation is required, as rains are seldom of sufficient quantity to sustain the tree and mature its fruit, except possibly in the mountain regions in the vicinity of natural springs or creeks.

Nowhere is less care taken in the cultivation of figs and in preparing them for market. The figs are simply dried on the smooth ground, on the top of the flat-roofed houses, on mats, or on anything else convenient. When dried and shriveled they are packed in 100-pound packages, the receptacles being made of rawhide of cattle and sewed together. These packages are very strong and stand the roughest handling. The figs are sticky, sirupy, and sweet, but inferior from want of care in curing and handling. They are sweeter than the same variety dried in California, and as well flavored as this kind of figs can be. Considerable quantities of black Mission figs are dried at Purisima. These figs are split before drying and sprinkled with anise seed. They are very good. The brebas are here used for drying in preference to the later crop.

In the mountains of the cape region from La Paz to San Jose del Cabo wild figs called the "Salate" are not uncommon, especially at a height of 1,000 to 3,000 feet in the canyons or on the northern slopes. This fig tree (*Ficus palmeri*), which carries a small, edible, round fig of poorest quality, is an evergreen tree.

The climate for producing superior figs is unexcelled on this peninsula, and there is no doubt that Baja California has a great future as a fig-growing country. In Sonora, on the Mexican mainland, two or more species of evergreen wild figs are found in the mountains, all having edible fruits, but small and of poor quality. The writer saw no variety in Sonora except the Mission black fig (Pl. VI, fig. 1), the fruit of which is consumed fresh. The black brebas or first-crop figs are large and really very fine. They ripen in May and have a great local reputation, the greater as fruits of all kinds are comparatively scarce in Sonora. No dried figs are prepared in Sonora; at least none worth mentioning. Still it is believed the climate would be suitable. The brebas or first crop is ended in May, and the second crop matures in July. It could be dried and all out of the way before the rain sets in.

The climate of this part of Mexico and Baja California is dry, but the air is damper than in upper California. Rain falls from June or July to November. The dry season extends from November to June or longer. Little rain falls, and after a shower the ground dries quickly. Frost is rare. In summer the thermometer frequently reaches 115°, especially around Hermosillo and Guaymas.

CHAPTER III.

FIG CULTURE IN CALIFORNIA.

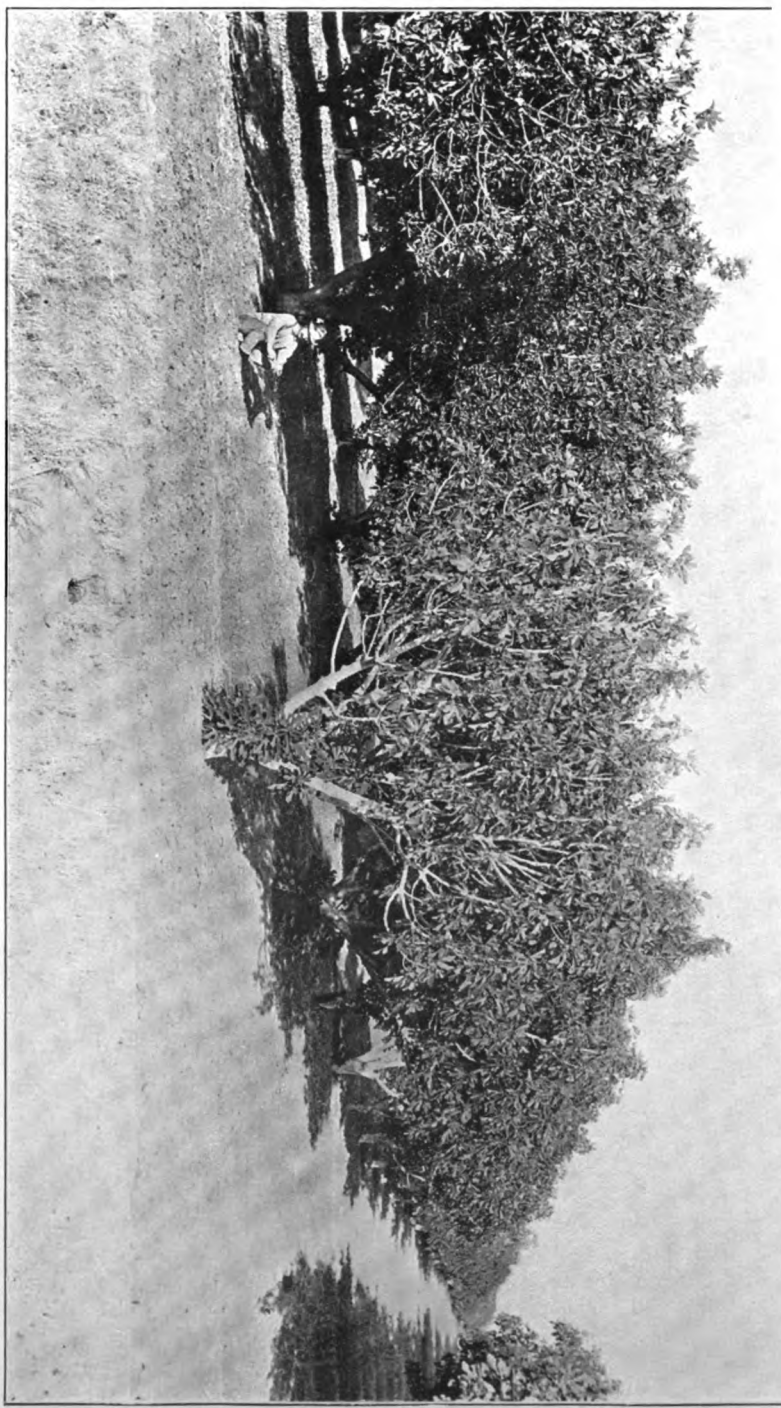
HISTORICAL NOTES.

The first fig trees in California were brought by the mission fathers of the Franciscan order. Where the first trees were planted and whence they came no one can now tell, but it is known that they must have come with the first missionaries in the eighteenth century, who planted them with the olive and the vine. Unlike the latter two, there was only one kind of fig, now known as the "Mission fig," indicating that it was raised from cuttings and not from seed. As the same Mission fig is the only fig variety extensively distributed in Mexico, it is safe to presume that the fig came from there, and not from Spain or Portugal or Chile, as is generally supposed. From Mexico the Mission fig spread to several of the Southern States, although it appears to have thriven less there than in California. The Mission fig must have been brought to Mexico centuries before, probably with the early missionaries from Spain after the conquest of the Mexican country. For a century the Mission fig was the only fig in California, the only fig cultivated, or rather planted, around the "missions," the only one found on the Mexican ranches, and was sparsely distributed over the country. With the arrival of Americans some of the immigrants from foreign countries brought fig cuttings from their cherished trees to plant in their new homes, and this will account for some odd varieties yet growing in out-of-the-way corners, and for others of which we yet hear some early settlers tell—trees which were long ago cut down or otherwise destroyed. With the advent of the 50's some systematic efforts were made to import other kinds of figs. The first importations came, of course, from American Eastern nurserymen, and the first figs consisted of varieties cultivated under glass in these Eastern States, which accounts for the little subsequent value of those varieties for outdoor culture. Among such varieties were Brunswick, Ischia, Brown Turkey, and a few others. Next came importations from English nurserymen; later from French nurserymen; but only within the last decade have efforts been made to import directly from foreign countries.

To give a list of all such importations would be of considerable interest to the student of California figs and their history, but it has been impossible to collect all the information required, and reference

A CALIFORNIA FIG ORCHARD. ROEDING ORCHARD, FRESNO, CAL.

Photograph by J. H. Alexander.



will only be made to a few of the most prominent of such introductions. While there has undoubtedly been a number of small importations, there are a few which require special mention.

In the mountainous parts of central California we find Felix Gillet as one importer of French fig varieties. In Stockton, W. B. West imported from various countries. John Rock, of Niles, has at various times brought large collections of figs to this State. G. P. Rixford was the first to bring the true Smyrna figs here direct from Smyrna in 1880, while in southern California the late John Grelek, a horticulturist of great knowledge and foresight, imported and distributed many valuable French figs. Another importer who should not be forgotten—his enthusiasm was certainly very great—was the late G. N. Milco, of Stockton, who brought a number of Dalmatian figs (Cernica, Zimitza, Kargigna) to California. Between 1882 and 1885 the author imported some 30 varieties of figs from France. In the latter year W. C. West was sent by F. Roeding to Smyrna and subsequently sent here several varieties of Smyrna figs. F. Pohndorff, then of Niles or vicinity, imported the White San Pedro under the name of Breba from Spain and distributed it in this country in 1883 or 1884. Dr. J. D. B. Stillman, of Lugonia, visited Smyrna in 1878 and selected Smyrna cuttings, which were, it is supposed, finally planted in California. Nothing came of this importation, as the box containing the cuttings could not be traced with certainty after its arrival here, and the figs which Dr. Stillman supposed to be Smyrna figs were proven afterwards to be Brown Turkey, and undoubtedly never came from Smyrna. Finally, it may be added, a Greek gentleman, Mr. Honchenko, lately living somewhere between Niles and San Ramon Valley, has imported and grown a number of varieties from his native country.

One of the earliest importers was W. B. West, than whom none is more worthy of being remembered. In 1853 he imported from Hovey & Co., of Boston, White Genoa, White Marseilles, White Ischia, Brown Ischia, Brunswick, and Brown Turkey, which figs were all propagated and widely distributed over the State. In 1869 Mr. West imported from France, through English houses, from 28 to 30 varieties of figs for the table and some for drying. They came via Panama in good order. He saved 16 varieties, but found only a few of them of any value in Stockton. Among these figs Mr. West received the Adriatic under another name (Verdoni?), now forgotten by him, and it is probable that to this importation the large grove of Adriatics at Knights Ferry, in Calaveras County, Cal., owes its origin. A few years later, in 1878, Mr. West went to the Mediterranean to study fruit culture. He selected there several varieties of figs, of which he has, however, unfortunately destroyed the record; but among these figs was the famous Neapolitan fig "Trojano." This fig did not prove satisfactory at Stockton and was never distributed.

As a rule Mr. West found that the fine varieties which he imported produced much better figs in the foothills of the sierra than in Stockton, and he was the first to recognize this region as superior for fig culture.

Among California importers John Rock stands most prominent. He has imported figs at various times from foreign countries, and possesses now the most extensive collection on the Pacific coast. The trees are at Niles, Cal., not far from San Francisco. Of the earlier importations there is no record, but in the spring of 1883 he received from Thomas Rivers & Son the following figs: Barnissotte Grise, Angelique, Col di Signora Bianca, De Constantine, Negro Largo, Early Violet, Lardaro, Black Marseilles, Drap d'Or, White Genoa,

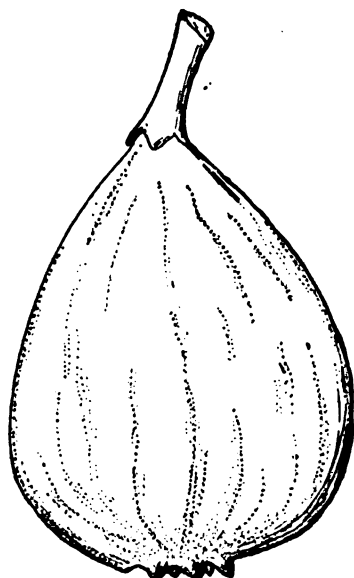


FIG. 8.—Du Roi fig.

Bondance Precoce, Brown Ischia, Prolific, Monaco Bianco, Brunswick, Bourjassotte Grise, Rocard, Col di Signora Nera, Grosse Grise Bifère, Royal Vineyard, Hirta, Brown Turkey, Ronde Violette Hative, White Marseilles, Bourjassotte Blanche, White Ischia, Du Roi (fig.8), Agen, Dorè Norbus, Pasteliere, Raby Castle, Bourjassotte Noire, Grassale, Black Ischia, Ronde Noire. In 1889 he received the following figs from a house in Provence, France: Salette, Martale, Rosso di Mensiglia, Grosse Violette, Des Dames, Bianca Morcati, Angelique, Avareugo, Crovere, De Calabria, Á Feuilles Trilobes, Courcourelle, Giallo Verde, Giallo Rotondo, Negrondo, Madalena, Aubique Leroy, Ronde Rouge de Provence, Imperial, Rolandina, Turco di Constantinople, Mascula. In the fall

of 1890 the Department of Agriculture at Washington, D. C., sent to Mr. Rock the Trojano, Dottato, Brizanzola, and Guigliana; and from a local nurseryman were received in 1891 the Capri, Smyrna, Verdale Longue, Cernica, Zemitza, etc.

Felix Gillet, of Nevada City, Cal., has at various times imported from France figs of the following varieties: Pagaudiere, Noir Moutier, Buissonne, Madeleine Blanche, Grosse Marseillaise, Datte, De Versailles, Franch Paillarde, Napolitaine, Verdale. These were imported in 1874. The following varieties were sent to Mr. F. Gillet from the United States Department of Agriculture, Washington, D. C., and are now being tried by him: Dalmatino, Broghetto, Rubaldo (undoubtedly Rubado), San Piero, Dottato, and San Vito.

THE BULLETIN IMPORTATION.

The importation of the genuine Smyrna figs to California was first due to G. P. Rixford, at that time connected with the San Francisco Evening Bulletin, which was then the acknowledged authority on horticultural matters in California. The following account is taken from the edition of that paper of October 17, 1888 and is, it is believed, from the pen of Mr. Rixford himself:

IMPORTATION OF FIG CUTTINGS.¹

Believing the soil and climate of California perfectly adapted to the growth of fruit equal to that imported from Asia Minor, also believing that failure to produce such fruit in the State was due to the absence of the right variety of tree, in 1880 the business management of this journal determined to make an effort to introduce a tree which produces the true fig of commerce, with the view of placing it in the hands of the subscribers of this journal throughout the State. In furtherance of this object the assistance of the Hon. E. J. Smithers, then United States consul at Smyrna, was solicited in procuring and shipping to New York, thence to be forwarded by rail across the continent, a lot of 500 cuttings of the best variety obtainable in that country. On the 1st of May, 1880, the following letter was received from Consul Smithers:

CONSULATE OF THE UNITED STATES,

Smyrna, March 31, 1880

BULLETIN COMPANY, San Francisco.

GENTLEMEN: Yours of January 24, requesting my services in procuring and forwarding some fig cuttings for distribution among the subscribers of your paper, was received on the 3d instant, together with a draft on London.

Immediately after the receipt of your letter I sent a trustworthy man to the fig district, situated about 75 miles from Smyrna. Owing to the severe stormy weather which prevailed at the time, the cuttings did not reach Smyrna until the 10th instant. I then learned that there would be no steamer for Liverpool before the end of the month, and deemed it better not to complete the packing until the last moment. The case was successfully shipped on the 29th, and the steamer left today. As directed, the bill of lading was forwarded to H. K. Thurber & Co., New York, and Richard Stewart, 11 Manchester Building, Liverpool, has been requested to look after its transshipment.

The case is 5 feet in length, 3 feet wide, and 2½ feet high. It contains 448 plants, packed in rich clay loam, such as the fig trees flourish the best in here. The packing took place under my supervision, and was after the plan of your letter. The top of the case is fastened down with screws, so that it can be easily opened at New York, and the plants, if they should need it, watered.

It is not possible to obtain rooted trees in this country, the fig-orchard men preferring to plant the cuttings in the field where the tree is to remain. My man was informed that owing to the warm weather in February it was too late to remove rooted trees, otherwise I could have sent you a small number. * * *

I inclose herewith a statement of expenses incurred, which, you will perceive, do not exceed your remittance. There being no drays in Smyrna, the heavy case had to be moved by porters and then by lighter to the ship lying some distance in the bay.

Hoping that your undertaking will be more successful than the others that have preceded it, I remain, gentlemen, very sincerely, yours,

E. J. SMITHERS.

¹In these cuttings Mr. W. B. West, of Stockton, had a one-fourth interest, and upon the arrival of the cuttings he took his share to his Stockton nursery and propagated his cuttings there. Governor Leland Stanford was also interested in this importation, the success of which was mainly due to his aid in facilitating rapid transit across the continent, and to the fact that he paid most of the expenses. His share of the cuttings was planted on his Vina Ranch, in Sacramento Valley.

Allusion is made in the letter to two unsuccessful attempts to forward shipments of fig trees to this city, one of which was completely dried out and dead on its arrival, and the other was mislaid somewhere while en route and never reached its destination at all.

The case of trees forwarded by Mr. Smithers did not reach this city until the 8th of June, 1880. A considerable portion of the wood had rotted, and the season was so far advanced that the cuttings, when planted, although the greatest care was taken with them, made but a feeble growth. However, 200 of them had formed roots during the summer and promised in time to make thrifty trees. To distribute this small number was altogether out of the question, where each of several thousands of our applying subscribers was expecting to receive a tree. About this time Consul Smithers arrived in San Francisco, en route to Chin Kiang, China, to which consulship he had just been promoted. He informed us that at the time the shipment was made he had caused to be planted 4,000 cuttings, which had in the meantime become rooted trees and which we could purchase from the party who then owned them at from 8 to 10 cents each, the usual price of trees in Asia Minor. It was then determined, rather than disappoint our subscribers who were expecting their promised fig trees that season, to import the whole lot. Funds were therefore forwarded to an agent in Smyrna to purchase the trees referred to and to ship them at once. About the 1st of April, instead of the trees, a letter, dated February 16, came to hand, from which the following paragraph is taken:

I have had Mr. ——— at my office, who says that the 4,000 cuttings he had planted, and to which your order refers (on E. J. Smithers's suggestion), have by this time grown up into strong young trees from 4 to 6 feet high, and he is offered \$1 per tree at the nursery at Aidin. He says he can not afford now to part with them at anything under \$1.25 each from this port (first cost).

The owner of the trees was an Armenian, a race of notoriously sharp traders, and put the price up to an exorbitant figure, because he thought he could get it, and probably has the trees on hand yet, the story of the offer from another purchaser being most likely a pure invention.

Correspondence with our agent, a prominent merchant in Smyrna, was kept up during the summer, and in September, 1881, orders were sent to make a large shipment of cuttings to the Bulletin Company, which we found could be obtained at a reasonable price. Every precaution had been taken to secure the safe arrival of this consignment, even to shipping moss from New York in which to pack the cuttings. The cases, on arrival at New York, were repacked by Peter Henderson & Co. before starting them across the continent.

The shipment consisted of 14,000 good cuttings, and arrived in excellent condition. A large portion of these cuttings were distributed early in 1882 to Bulletin subscribers in all parts of the State. It was estimated that about one-third of this first distribution escaped destruction by gophers, drought, and other casualties. Many of these were planted in unsuitable soil and unfavorable locations as to climate, so that but few favorable reports were received regarding them after they were old enough to commence bearing. In most localities the trees made a rampant growth, but the fruit dropped before ripening. Parties who had visited the fig orchards of Asia Minor were sure that we had been imposed upon, and had received some wild and worthless variety which grows along the fences and dividing walls of that country. Much other adverse criticism, principally from business rivals, was published, and further information was sought from our agent in Smyrna. He wrote that it was impossible that wild cuttings were sent, as it was easier and cheaper to get the best, as that variety was most abundant; and furthermore, that "the cuttings were obtained from one of the most renowned orchards in the Aidin Province." About this time E. J. Smithers, for twenty years United

States consul at Smyrna, was in San Francisco again, and was taken to our nursery of fig trees. At that time the trees were covered with fruit, and he at once said that they could not be the wild fig, for the reason that the wild variety never attained so large a size as the fruit on the trees before him. He was satisfied that the variety was all right. W. B. West, of Stockton, who has probably imported more kinds of fig trees, and first brought to notice the Verdone, an Italian variety, which has been christened "White Adriatic," in this State than any other man in California, and who had a part of our importation, never for a moment doubted that he had the right variety. Feeling convinced from reports from a few favored localities that we had made no mistake, several thousand more cuttings were distributed in the winter of 1882-83 and again in 1885-86. These further distributions thoroughly disseminated the variety.

As Mr. Rixford says, much adverse criticism was made on the failure of the Bulletin figs to ripen their fruit, and many who ought to have known better pronounced the figs wild figs, which had been maliciously substituted by the Syrians. It is now known that this was an error and that the varieties were the genuine Smyrna figs. On the other hand, many reports came in stating that the Bulletin figs had borne fruit. Among the reports which caused the greatest sensation was one made by a gentleman at the fruit-growers' meeting in Chico, November 22, 1888. This long controversy can not now be referred to in detail. Enough to say, the gentleman submitted dried figs supposed to have come from two Bulletin figs growing on his place in ———, Cal. The figs were said to have been cured without sulphuring. It is now known that these figs were not the Bulletin figs, but simply the "Adriatic," and that the figs had been sulphured before drying in order to give them a good color. It is now absolutely certain that no Bulletin figs have come to perfect maturity in California without artificial pollination, as has been described elsewhere, and the nature of this fig variety is such that they never can fully mature without pollination or caprification, this being a conclusive proof of their being the genuine Smyrna figs of commerce.

The history of the Gentile fig in California has somewhat the touch of a romance. In 1851 or 1852 Mr. Robert Farlay, of San Leandro, Alameda County, found a small package outside of the post-office in San Francisco. It contained two cuttings, which were planted in his nursery. The tree was killed by gophers, but a cutting was saved and grown, and gradually became large. Farlay propagated the fig tree and sold trees around the country. In 1886 Dr. Ed. Kimball, of Hayward, took a cutting from a large tree of this fig growing in the town of Hayward and planted it on his place near the town. The original Hayward tree is now cut down, but Dr. Kimball's tree is yet a fine large tree bearing well. The writer has seen other trees of this same kind in other places near Niles, at West Oakland, and also on Central avenue, in the town of Alameda. It is remarkable that such a fine fig has not been more widely distributed, though it has been in the State for forty years. This fig is now planted at Knights Ferry, Cal., where it produces very fine first-crop figs, which dry well.

The second crop drops always, as might be expected, it having the same habit in Italy.

The Adriatic fig, of which so much has been said and written, has probably been growing in California for nearly forty years, as some large trees at Big Oak Flat, in Calaveras County, were supposed to be of this variety. Certain it is that it has been scattered over the Sierra foothills for many years, though not known under any special name.

The first importation of which the writer is fairly certain was made by W. B. West, of Stockton, Cal., who received this tree, together with 21 or 22 other varieties of figs, from an English nursery, by way of Panama, in 1865. He sold trees to several parties, among them Captain Gray, of Merced County, who planted them on his ranch at Atwater.

Later another gentleman of Stockton, Dr. Sposati, is also said to have received the same tree from its native home on the east side of Italy, under the name of Fico di Fragola, and distributed it here under the translated name Strawberry fig. The late G. N. Milco, of Stockton, claimed to have been the first importer of this variety, which, however, is an error. He found the trees growing on the ranch of Captain Gray, the trees then being 10 years old, and, recognizing the value of the fig, named it the Adriatic, after his native home (Ragusa), where, however, the tree does not grow. His supply of cuttings, however, came from a tree planted by Mr. Andrew Simpson, in Stockton, who had bought the tree originally from West.

Mr. Milco did much toward making the variety known, but also much toward keeping the growers in the dark as regards its true nature. Since 1884 the variety has been extensively cultivated in California and distributed to many of the Southern States, especially Florida. It is a fine variety in some localities, but in others worthless. Even at its best it makes only a second-quality dried fig, though when fresh the figs are delicious when properly grown.

IMPORTATIONS OF FIGS BY THE UNITED STATES DEPARTMENT OF AGRICULTURE.

By far the most important importations of figs are those made at various times by the United States Department of Agriculture. Fig cuttings have been distributed by that Department almost yearly for the last twenty-five years or longer. In order to obtain for California a properly labeled collection of figs the Department of Agriculture, under Secretary Rusk's administration (1889-1893), was requested to import the whole collection of figs grown in the hothouses of the Royal Horticultural Society of London, the best known collection of figs in the world. Professors Van Deman and Taylor, of the Department, favored the project, which, however, was only brought to a successful issue under the administration of Secretary Morton in February, 1894, and mainly through the good will and efforts of the assistant pomologist. William A. Taylor.

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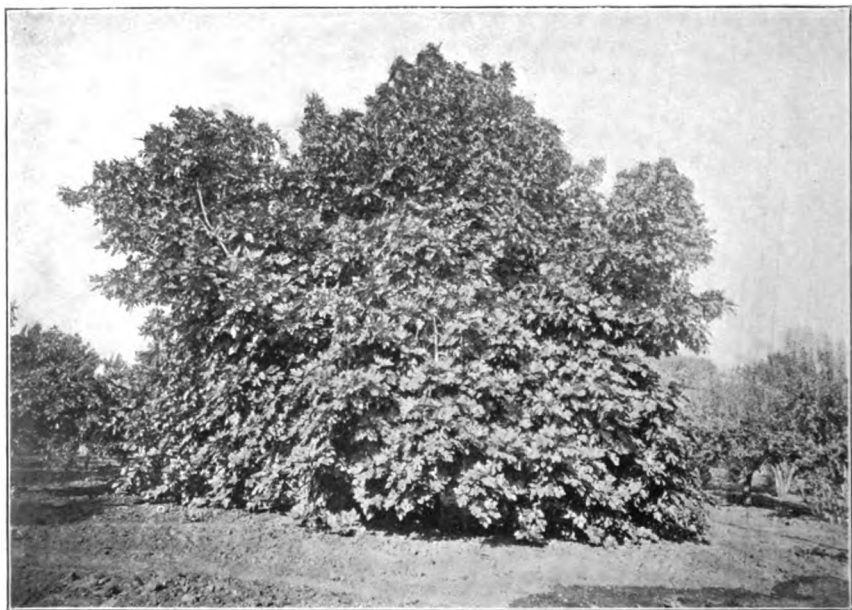


FIG. 1.—MISSION FIG TREE ON TEJON RANCH, KERN COUNTY, CAL.

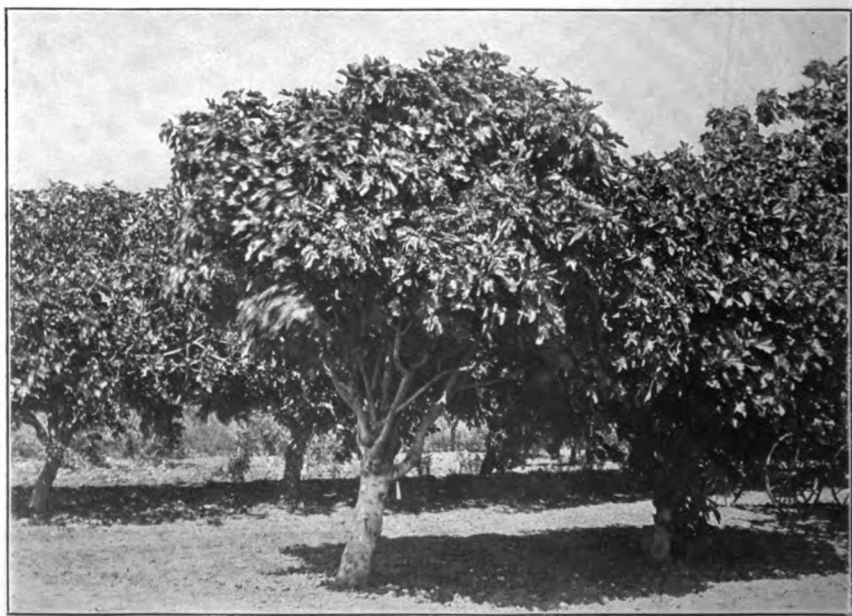


FIG. 2.—GRAFTED SMYRNA FIG TREE. CUTTINGS IMPORTED BY THE U. S. DEPARTMENT OF AGRICULTURE AND GRAFTED AND GROWN BY JOHN ROCK AT NILES, CAL.



FIG. 1.—BROWN TURKEY FIG TREE, JOHN ROCK ORCHARD, NILES, CAL.



FIG. 2.—FIG ORCHARD OF JOHN ROCK AT NILES, CAL.
The capriffs are seen where the ladder stands.

The whole of the above-mentioned collection was received by the Department of Agriculture in February, and forwarded at once to Mr. John Rock and the writer, who jointly signed an agreement with the Department in regard to subsequent disposal of cuttings, etc. In all, about 66 named varieties were received in cuttings, which at once were grafted by Mr. John Rock, at Niles, on old fig trees. Great success was achieved, a good growth being had by all the varieties sent, none being lost. (Pl. VI, fig. 2.)

The following is a copy of the memorandum of grafting made by Mr. John Rock:

FIG ORCHARD RECORD.

List of cuttings received from the United States Department of Agriculture grafted in orchard of California Nursery Company, lot 8, Block B, at Niles, Cal., as follows:

Row No. 9.

On tree 1, De l'Archipel.	On tree 29, De Jerusalem.
On tree 2, Bontard.	On tree 30, Nebian.
On tree 3, Grosse Marseilles.	On tree 31, Vigasotte Bianco.
On tree 4, Peau dure.	On tree 32, Grise Savantine Bifère.
On tree 5, Negronne.	On trees 33-39, both inclusive, Missing.
On tree 6, Bourjassotte Noire.	On tree 40, Quarteria.
On tree 7, Poulette.	On tree 41, Reculver.
On tree 8, Œil de Perdrix.	On tree 42, Douro Vebra.
On tree 9, Du Roi.	On tree 43, Gouraud Rouge.
On tree 10, This tree is missing.	On tree 44, D'Agen.
On tree 11, Grosse Violette de Bordeaux.	On tree 45, Lampas.
On tree 12, Datte.	On tree 46, Large Black Douro.
On tree 13, Monstrueuse.	On tree 47, Adam.
On tree 14, Bourjassotte Grise.	On tree 48, De Constantine.
On tree 15, A Bo's Jaspé.	On tree 49, Biberacao.
On tree 16, Royal Vineyard.	On tree 50, Grosse Verte.
On tree 17, De Grasse.	On tree 51, Violette Sepor.
On tree 18, Euscaire Preto.	On tree 52, Dr. Hoggs Clare.
On tree 19, Trois Recoltes.	On tree 53, Hardy Prolific.
On tree 20, Monaco Bianco.	On tree 54, Figue d'Or.
On tree 21, Bondance Precoc.	On tree 55, Recousse Noire.
On tree 22, Trifère.	On tree 56, Black Douro.
On tree 23, Green Ischia.	On tree 57, Grassale.
On tree 24, Hirta du Japon.	On tree 58, Martinique.
On tree 25, St. Johns.	On tree 59, Cravé.
On tree 26, Vebra.	On tree 60, White Ischia.
On tree 27, Datte Quotidienne.	On tree 61, Brown Turkey. (See Pl.
On tree 28, Arbal.	VII.)

Row No. 10.

On tree 45, Pastiliere.	On tree 51, Black Ischia.
On tree 46, Negro Largo.	On tree 52, Toulousienne.
On tree 47, De la Madeleine.	On tree 53, Gouraud Noire.
On tree 48, Col di Signora Bianca.	On tree 54, Dorée.
On tree 49, Dorée Nobis.	On tree 55, Grise Savantine.
On tree 50, Pingo de Mel.	On tree 56, Brunswick.

As seen from the above names and further reference to the catalogue, nearly all these figs come from Italy, Spain, and France, and not a single one from Asia Minor. None, in fact, belongs to the race of figs which requires caprification to set fruit. This will explain why the European students of this collection of figs have failed to recognize the nature and necessity of caprification. This collection of figs, being the one used by Dr. Hogg in his well-known work on fruit culture in England, will always remain a standard collection for identification of varieties.

IMPORTATION OF BLASTOPHAGA.

The first importation of the live *Blastophaga* to California was made in the spring of 1891. At that time the late Mr. James Shinn received from a friend in Smyrna several small boxes with caprifigs containing live *Blastophaga*. As Mr. Shinn possessed at his place at Niles the largest and oldest trees of the Bulletin importation of Smyrna figs, he had naturally taken interest in the fig question. Having as a friend a missionary in Smyrna, he had requested his assistance in procuring the insects. The latter were turned loose among his Smyrna fig trees, and the insects were seen to hatch and fly about. Later, in July of the same year, another shipment of *Blastophaga* was received by Mr. Shinn from the same gentleman. These were turned out among the fig trees at the end of July, during a visit to Niles of Mr. E. W. Maslin and the writer. None of these insects succeeded in taking hold. There were two reasons for this, as the writer pointed out at the time. One was that the only caprifig then growing on the spot produced only a single crop a year. When the insects flew out there were no young caprifigs in which to lay eggs. The other reason was that the *Blastophaga* had hatched on the road and had, of course, been fertilized by the males at the time. As this had taken place some time previous, it was probable that the eggs had degenerated and become reabsorbed. All the males were dead upon the arrival of the figs, and even if they had been alive no new copulation could have taken place. During the following few years caprifigs containing *Blastophaga* were received from Smyrna by Mr. George Roeding and Mr. Anthony C. Denotovitch, of Fresno, Cal., but the *Blastophaga* always failed to take hold, for the reasons stated above. All the caprifigs imported so far had been of the second crop, or mammoni. So far no mamme had been received. Previous to this, or in 1890, during the author's visit to Washington, D. C., both Dr. C. V. Riley and Dr. L. O. Howard had taken a lively interest in the caprifig question. When Dr. Howard later on became the head of the Division of Entomology, he decided to introduce the *Blastophaga* to California, and, if necessary, send some one to Smyrna to secure them. He was authorized by the Hon. James Wilson, Secretary of Agriculture, to make the attempt, and in 1897 communicated with the author and

asked if he would undertake the journey. In the spring of 1896 Mr. Walter T. Swingle, then studying at the Zoological Station at Naples, became interested in the problems of caprification, which had been so much investigated in that region. In 1898, during a second stay at the Zoological Station, he made more extended studies, in which he had the benefit of the advice and help of Count Solms-Laubach and Dr. Paul Mayer, the recognized authorities on the subject. During March and April he secured and sent at his own expense the first shipment of mamme caprifigs, which were packed by a new method. This was the first time the mamme generation of caprifigs had been sent to America. They reached California in April in good condition, but although the insects came out by hundreds they failed to become established. Shortly afterwards Mr. Swingle was appointed an agricultural explorer in the newly established section of Seed and Plant Introduction. Since he was on the spot and was so well fitted for the work, it was considered unnecessary to send another investigator abroad, and Mr. Swingle was instructed to continue on behalf of the Department his efforts to introduce the fig insect and suitable varieties of the caprifig tree.

Mr. Swingle studied the methods of fig culture and caprification in Algeria, Sicily, Naples, Greece, and Smyrna, and forwarded a number of mamme caprifigs from Algiers in the spring of 1899. These caprifigs arrived in good condition and were sent by the Department of Agriculture to Mr. George Roeding, of Fresno, whose large and healthy fig orchard had been selected as the best for the purpose by Dr. Howard, after a personal examination in the spring of 1898. Mr. Roeding, by the way, had also repeatedly imported the *Blastophaga*, but all had failed to establish themselves in the caprifigs. As a result of the last Government introduction of *Blastophagae* to the Roeding orchard, it is most gratifying to know that at last the fig wasps have been properly established in California, both at Fresno and at Niles, and there is now every prospect that, with proper care and with proper distribution of caprifigs in frost-free localities, these insects will become so acclimated that no more introductions will be required. In order to study the intricate problem of the relationship of the *Blastophaga* and the caprifig, Dr. L. O. Howard, chief entomologist of the United States Department of Agriculture, directed Mr. E. A. Schwarz to proceed to California in the spring of 1900. As a result of the investigations of Dr. Howard and Mr. Schwarz, the former has contributed to the Yearbook of the United States Department of Agriculture for 1900 a most important account of caprification in California.¹

¹The article has also been reprinted in separate form, and copies of the same may be obtained upon application.

CHAPTER IV.

CAPRIFICATION OF THE FIG.¹

Caprification of figs is a practical process based on scientific principles, which latter are as interesting and have been as badly misunderstood as those connected with the practical part of the process. From time immemorial caprification has been practiced in certain countries, and practical results have been claimed for it. As regards the practical value of caprification, there are two distinct and opposite views held by different investigators. Some claim that caprification is necessary and valuable; others hold that it is useless. As regards the scientific principles involved, there are also various views put forward, as will be explained further on, some of which are radically opposite to others. The chief reason why this question was not solved long ago has been twofold. First, many of the scientific investigators have not been practical horticulturists; while others have not been aware that they experimented on figs which really did not require caprification, and which would not be benefited by it.

Every investigator began and ended his researches with the erroneous idea that all cultivated figs were alike, and he drew his conclusions accordingly. This alone explains the indifferent results achieved so far by European investigators.

The many points involved in these interesting questions are both practical and scientific, and the two groups are so interwoven that the one can not possibly be understood without a full knowledge of the other.

I am anxious that this may be understood in the beginning, as in the following pages practical details will be found hand in hand with scientific studies. The practical cultivator who knows but little of scientific phraseology would not understand the terms unavoidably used below, unless they were properly explained. Similarly, the scientific investigator, whose interest in this subject lies principally in the process of caprification and in its supposed value or uselessness, would not properly understand the practical details connected with the horticultural crops of the figs, unless they were explained in a way that may seem too elementary to the horticultural student or practical botanist.

¹ A more extended treatise of this subject by the author was published in the Proceedings of the California Academy of Science in 1896.

PRACTICAL CAPRIFICATION IN CALIFORNIA.

The requisites for caprification as now practiced in the State of California are genuine Smyrna fig trees, two or three varieties of caprifig trees, and colonies of *Blastophaga grossorum* or fig wasps, occupying the caprifigs.

There are two or three desirable varieties of genuine Smyrna fig trees to plant, all of which can now be had in California. They are known in that State either as Bulletin Smyrnas or as Lobfigs, the former named on account of the corporation which made the first introduction of the cuttings, the second on account of the name used in Smyrna. In the catalogue several local names of the several varieties are found and which will in time be used. The trees are planted from 40 to 50 feet apart. As soon as the figs begin to bear they may be caprificated. The trees bear the first year, but not profitably for several years. It has been found from experiment that a fully developed caprifig of the best variety will and can contain on the average some 600 *Blastophaga* wasps. With this as a basis for calculation we find that under favorable circumstances it will require one caprifig tree for every 50 Smyrna trees. One tree for every 100 Smyrna trees may suffice in very favorable seasons, but the greater number is safer. The caprifig trees should not be set among the Smyrna trees for several reasons. The caprifigs require sheltered places and shade; the wasps require when hatching figs of proper size in which to lay their eggs; and finally it is necessary to evenly distribute the *Blastophagas* when caprifying the trees, as otherwise some trees will get too many while others will get too few wasps. For these reasons the caprifig trees are set by themselves in sheltered places. It is best to have plantations of caprifig trees in places some distance from the fig orchard as well as near it.

The chances of having caprifigs in the necessary stage of development are thus enhanced. It is also advisable to plant two, three, or more varieties of caprifig trees together in a grove, in order that figs of proper size may never be wanting from one end of the year to the other. The caprifig trees are set in the form of hedges about 10 by 20 feet. The wasps prefer shade and cool places and such places must be provided for. On this account the limbs of the caprifig trees should be allowed to grow low and shade the ground. The trees should be pruned only when necessary to cut away dead limbs. In order to introduce the necessary *Blastophaga* wasps it is only necessary to procure caprifigs containing colonies. These caprifigs are suspended in the growing caprifig trees at a time when they carry figs of proper size to receive the wasps. This is during the months of April to October, according to locality and crop. To start a colony of *Blastophaga* wasps in a caprifig tree requires from one to five good caprifigs. The grower must examine his caprifig trees after the

winter frosts are over, in February or March, and ascertain if the *Blastophagas* in the mamme-figs have stood the winter. If the mamme have remained plump and heavy the crop of wasps can probably be depended upon to issue in due time. But if all the mamme of the caprifigs have fallen during the winter, then it will be necessary to procure fresh mamme-figs from some other place and suspend them on the branches of the caprifig tree in a shaded place. The time for doing this will be, according to locality, during the latter half of March or beginning of April. The grower must be constantly examining his caprifig trees to ascertain if his colonies of wasps are in good condition. If any of the caprifig crops fail, wasps should be imported anew. It may thus be necessary to caprificate the profichi, the mammoni, and the mamme, as either of these crops may appear too late to be affected by the wasps. Hence the necessity of having caprifig trees of different varieties in various localities.

The Smyrna fig trees are caprificated in the months of June and July, according to locality. When the Smyrna figs reach the size of a hazelnut or a large filbert they are generally in condition to be caprificated. If as large as a walnut they are probably too old for the wasps to take hold. When in proper condition caprifigs are procured and strung on raphia or esparto grass, one or two figs at each end of a string. The number of caprifigs necessary to caprificate a Smyrna fig tree depends upon two things—the age of the Smyrna fig tree, or rather upon the quantity of its figs, and upon the number of wasps in the caprifig. At present there are no Smyrna fig trees in California over 20 years old. For a tree of that age, and provided it is growing in good soil and has been well cared for, from 10 to 12 caprifigs will suffice. If older, more caprifigs will be necessary, and probably in any case 50 figs will suffice. This small number of caprifigs required in this country compared to what is necessary in Asia and Africa is due either to the fact that we have imported the *Blastophaga* wasps without their natural parasites, or to the lesser age and consequent yield of our trees. In Asia, Africa, and Europe the *Blastophagas* are decimated or even to a greater extent diminished in number by parasitical wasps also infesting the caprifigs. When such is the case it is evident that more caprifigs are necessary to caprificate a certain tree. The crop used for caprification of the Smyrna figs is the profichi crop. This crop is the first crop of the caprifig—the one which appears on the old wood. The crop which the profichi caprificates is the second crop of the Smyrna fig—the crop which sets in the spring and matures the same summer.

It is of the greatest importance that no more caprifigs should be imported to the United States, as it is almost certain that they would introduce the natural enemies of the *Blastophaga* wasps. In caprifying the trees the caprifigs are most conveniently strung on any soft and flexible grass. This is best done in the shade under the trees or

under a temporary shed or tent. The strings are hung on horizontally supported rods of cane, and these rods are carried into the field by the caprificator. In this way the figs do not become entangled. In selecting a place on which to hang the strings one that is shaded is preferable. A string is taken from the rod or cane and suspended on a branch of the Smyrna tree and given a twist so that it will not fall off. The process of caprifying the trees should be repeated several times, or as long as it is desirable to procure ripe Smyrna figs. During the first caprification one-half of the caprifigs necessary may be suspended. Ten days later the other half may be similarly suspended. Should more young Smyrna figs appear after a week or two it may be advisable to suspend a few more caprifigs in order that they too may be caprificated.

SHORT SUMMARY OF CAPRIFICATION.

Caprification is a horticultural process which consists in suspending the profichi or first-crop figs of the caprifig on the branches of the edible fig. The object of caprification is to produce seed in the edible figs and to cause these latter to set and mature. Only such profichi as contain fig wasps (*Blastophaga grossorum*) are of any value in caprification. Shortly after the profichi have been suspended the female *Blastophagas* hatch out of their galls, and in their efforts to leave the fig become covered with the ripe pollen of the caprifig. Once outside of the caprifig the *Blastophagas* search for other caprifigs in order to lay their eggs in them. But not finding any caprifigs, they enter the edible figs by mistake. The effect of this visit is the pollination of the edible-fig flowers with the caprifig pollen brought along by the wasps. The pollination again causes the edible figs of a certain class to mature seed and to set its fruit. In order that pollination may be properly accomplished, it is necessary that the figs practiced on should have female flowers in a proper state of development with receptive stigmas, and that the pollen of the caprifigs should be properly developed and in a good condition. Not all edible figs are equally susceptible of caprification. The time for caprification is in June and July, according to locality. Caprification is nothing else than an artificial pollination accomplished partly by man, who suspends the caprifigs, and partly by the wasps, which carry the pollen from the caprifig to the female flowers of the edible fig.

The same process of pollination accomplished by the wasps on the edible figs is also necessary in the caprifigs in order that they may produce ripe and fertile seeds. No caprifigs will produce seed if the wasps are not present carrying the pollen from one crop to the other. Also in the case of the caprifigs man's aid is at times required. The *Blastophaga* wasps breed and hatch in the wild caprifigs, hence no human aid is required to bring these figs from one tree to the other, but all cultivated caprifigs are caprifigged in order to insure a crop of wasps.

If the wasps could breed and live in the edible figs no caprification would be required. When through unfavorable climatic conditions the *Blastophaga* crop fails, when the early spring frosts kill the young wasps and their eggs and larvæ, or in the case of some varieties of cultivated caprifig trees, man's aid is required. The grower must then supply caprifigs with live wasps from some distant part and transfer them both to the caprifig trees in order to start new broods and to the edible figs in order to caprificate them. This is done at times in Asia Minor, when often after heavy frosts whole shiploads of caprifigs are imported from Greece to supply the necessary wasps. Caprifigs suitable for caprification are regularly sold in all market places in the fig-growing countries around the Mediterranean.

After this short summary of the process, caprification will be considered more in detail. A horticultural and botanical study of the fig, its flowers and crops, is required in order to fully comprehend the necessity, importance, and nature of this interesting and complicated process.

CROPS OF THE FIGS.

General remarks.—The caprifig, as well as the edible fig, bears several distinct crops every year. So distinct are these crops and so important does the distinction between them appear to those nations which depend upon fig culture as an article of food and commerce that the various crops have been given separate and characteristic names.

In order to understand these names a detailed description of the various fig crops is necessary. We must bear in mind that while the fig and the caprifig crops in a general way resemble each other, they still disagree in some important points. This may also be said to be the case with the principal types of the edible fig. In a general way it may be stated that we have three distinct crops, each one appearing at a separate time—spring, summer, and fall—according to the season in the respective countries. But each one of these crops is characterized in a peculiar way, and without a full knowledge of them a perfect understanding of caprification is impossible. (Pl. VIII.)

The various crops of the fig.—While the edible-fig tree may possess three distinct crops, we do not always find all these crops following one another on the same tree. This may be and often is the case, but fig trees and fig varieties exist in which one or more crops are wanting. The first, second, or third crops may be respectively suppressed, or one of these crops may be present while the other two are suppressed.

Shortly before the fig tree begins to leaf out in the spring, small button figs are seen pushing out from the wood of last year below the young leaves of the present season. The place where these figs develop is the place where during last season existed a leaf, which

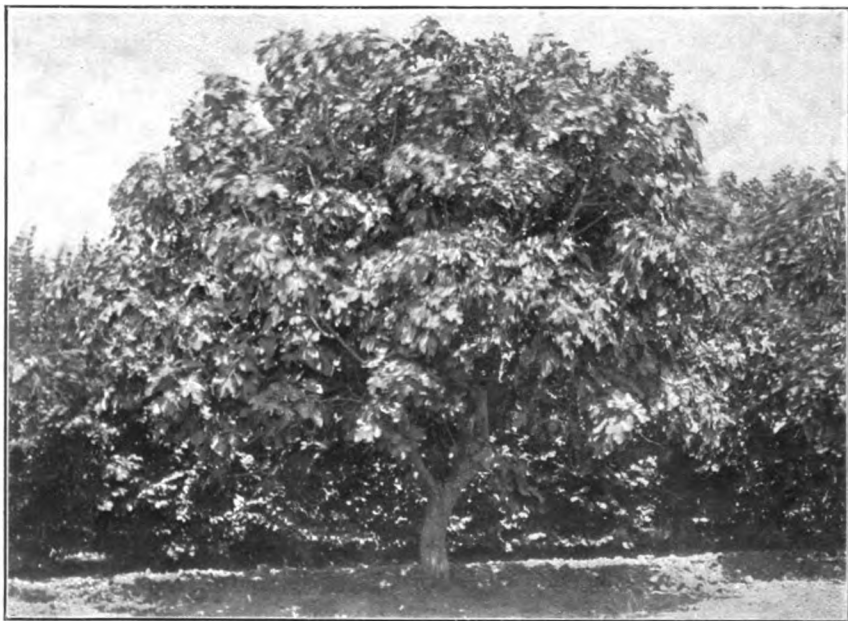


FIG. 1.—GROSSE GRISE BIFÈRE FIG TREE, JOHN ROCK ORCHARD, NILES, CAL.

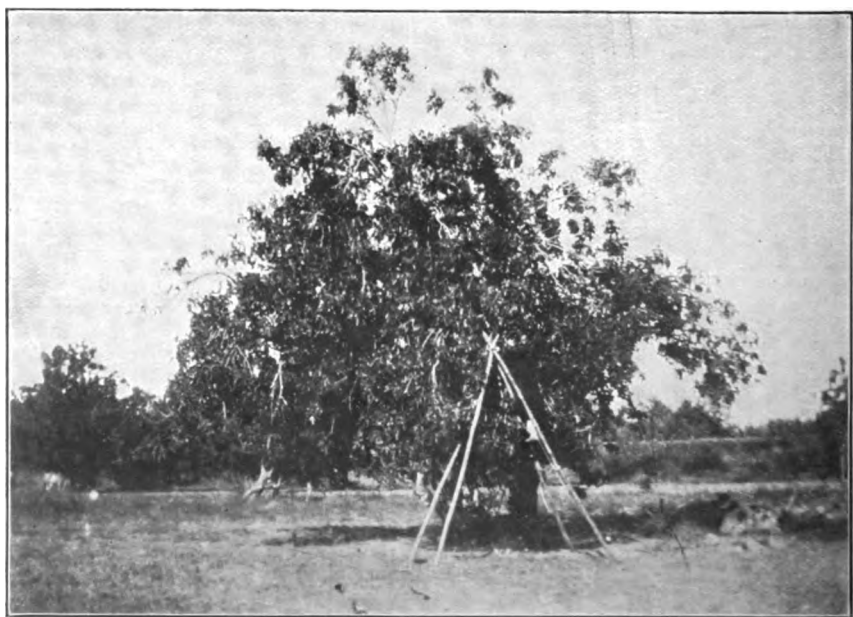


FIG. 2.—CAPRIFIG TREE, FRESNO, CAL.

fell off last fall. These figs grow rapidly and mature generally in the end of May in all southern countries or in June in more northern ones. This is the first crop of figs, also known as early figs or brebas, first figs, or summer figs. This crop of figs has not yet matured, or, in some varieties, has hardly matured, when other young figs are seen to push out from the leaf joints of the present year. In the course of a month or two these figs ripen and constitute the second or main crop. With most figs this crop ripens in August, later or earlier, according to variety. This crop is also known as second figs, autumn figs, or late figs.

A third or later crop is found in some varieties, forming in August and ripening in winter. This may be called the third crop; but this third crop is not greatly distinct from the second crop. Both develop from the leaf joints of the same season. In reality, this third crop of edible figs can only be considered as the last of the second crop. The first crop is, however, entirely distinct from the second crop, as it is produced on the old wood. Sometimes the last figs of the third crop do not fall in the autumn, but winter over and ripen early in the next spring, just as the first crop, and are thus hardly distinguishable from it.

The crops of the caprifig.—In the caprifig the three crops correspond to those of the edible fig, but, as in that fig, they are not always all present in the same tree. Thus caprifig trees exist which develop only one crop, while others possess two or three crops. The variation in crops may be confined to individual caprifigs of the same variety, or it may characterize some special variety, in which all the trees are exactly alike. The variation may also depend on the seasons.

At Niles, Cal., the crops of the caprifig succeed each other in the following manner: At the time of frost, in the fall, we find a large number of figs as large as walnuts or hazelnuts situated at the very tips of the branches. These figs began to appear as small buttons in July (1900) and continued to increase until they became of size to be caprificated in September. This crop of end-figs is known as the third crop (the mamme), and is really only the continuation of the second crop. But it differs from the second crop in its faculty to pass the winter unharmed on the trees. The following year in March these third-crop figs, or mamme, become fully mature, and the wasps which escape from them enter the first crop (the profichi).

The first crop (the profichi) began to appear as small buttons in December. They increased very slowly at first during the winter, but toward spring they became quickly larger, and in March they had reached the size in which they were caprificated. They then varied between the size of a pea and a hazelnut. In June and July, according to locality and season, these first-crop figs are fully mature, and are then used for caprification. These first-crop figs (the profichi) were situated on the old wood—the wood of the previous year. In

this they differed from the second, or mammoni, which mature on the wood of the same year.

The second crop (the mammoni) began to set in June and became mature in August. It appeared as buttons on the green wood and matured while this wood was yet green. It was the only crop which did not pass the winter. The purpose of the second crop is to furnish wasps for the third crop (or mamme), which passes the winter on the trees, and to furnish seeds.

To recapitulate, we find that the first crop (or profichi) passes the winter as very minute buttons on the old wood and matures the following summer. The second crop (or mammoni) begins and matures the same season, and passes its entire existence during the summer. The third crop (or the mamme) passes the winter as large figs (hence the name), fully developed or almost fully developed, and its figs are the first of the caprifigs to mature in the spring. The third and first crops are thus both found on the old wood. The second crop alone begins and matures on the green wood.

A perfect caprifig tree must possess an overlapping of crops. If any crop should fail, it would be fatal to the wasps living in the figs, unless they had figs in other trees in which to breed.

In the best Smyrna varieties the various crops of the caprifig are confined to distinct trees, which again have received distinct names. The trees which bear the winter crop, boghadhes, are known as "orginos boghadhes," while those trees which bear the spring crop, or ashmadhes, are known as "orginos ashmadhes."

The winter crop, or the orginos boghadhes, seldom contains any male flowers and pollen. This tree may, however, have an earlier crop which bears male flowers.

The orginos ashmadhes, again, which produce the figs used for caprification, which crop is the first crop, or the ashmadhes, do, as a rule, never possess any other crop. It will therefore be seen that in order to possess a complete succession of crops of the caprifig we must either cultivate varieties which bear several crops on the same tree, or, if we grow the Smyrna "orginos," we must have both the boghadhes and the ashmadhes trees. The former breed the first crop of blastophagas; the ashmadhes again breed the second crop of blastophagas from eggs laid by the wasps hatching from the boghadhes.

As the boghadhes or winter crop and the ashmadhes or spring crop in Smyrna are often produced on different trees, it will be seen that either we must have both of these trees in the same orchard, or we must caprificate the trees bearing only one crop. The latter plan is adopted in Smyrna, where only orginos ashmadhes are cultivated. The reason of this is that comparatively few boghadhes or mamme are required for the caprification of the ashmadhes or profichi, while an enormous quantity of ashmadhes is necessary for the caprification of the edible figs. It is easier to bring in the few boghadhes required from the

hills than to cultivate them. Besides, the trees bearing the boghadhes generally grow in frost-free places in the hills, the frost in the orchards being apt to kill both the figs and the wasps.

Names of the crops.—In order to avoid misunderstandings, the various crops are given distinct names in all foreign countries where fig culture is prominent. The crops of the caprifig, which not always correspond with the crops of the edible figs, are named differently. The following table will give a clearer idea of these names. As the English language has no suitable names for the various crops of the caprifig and the fig, I propose that we, for the early first crop of edible figs, adopt the Spanish name "brebas," and that we simply call the second crop of edible figs "figs," or autumn figs. For the caprifig I believe we can do no better than adopt the nomenclature of the German specialists who now use the Neapolitan names profichi, mammoni, and mamme. Dr. L. O. Howard¹ questions the existence of three distinct crops of figs. This question is not yet settled, and while it may prove botanically correct to refer to the crops as only two—figs which attain their full size on the old wood, and figs which attain their full size in the axillaries of the leaves—still it certainly is horticulturally convenient to speak of the fig crops as if they were three distinct ones, even if the three crops are not always found on the same tree.

Names of various crops of edible figs (Ficus carica L.).

	First crop (April-August).	Second crop (June-August).	Late (November).
France	Figues-fleurs or Florones.	Figues d'automne; Figues ordinaires; Figues automnales.	
Italy	Flori. Fichi primattici Floroni.	Pedagnuoli; Forniti	Cimaruoli.
Spain	Brebas	Higos	
Portugal	Figos lampos	Figos vendimos	
Morocco	Bukor	Karmus	
Kabylia	Ourgalen and bakour	Akerkouch	Azoubzeg, inirém.
Algiers	Bocôre	Kermes or kermouse	
Venice	Bolos		
Greece	Prodromoi, ornos	Fornites	
California	Brebas	Figs, summer figs	Autumn figs.
Latin	Grossi	Forniti	
Nicôise	Figa flou	Oustinchî	

Names of the caprifig and its various crops (Ficus carica L.).

	Caprifig tree.	First crop (October-June).	Second crop (June-August).	Third crop (July-March).
France	Caprifignier			
Italy	Caprifico	Profichi	Mammoni	Mamme.
Spain	Caprahigo			
Portugal	Fico de toca			
Arabic Spain	Obzakar			
Greece		Orni	Fornites	Cratitires.
Kabylia	Doukkar			
Morocco	Tokkar			
Malta	Tokar	Tokar ta noss	Tokar tayeb	Tokar leoul.
Ancient Greece				Olynthoy.
Asia Minor	Ilick, or orginos	Ashmadhes		Boghadhes.
California	Caprifig	Profichi	Mammoni	Mamme.

¹ Smyrna Fig Culture in United States.

Characteristics of the various crops of the caprifig.—In the foregoing it has already been pointed out that the various crops of the caprifig differ from one another in several respects. Here it is only necessary to generalize. The profichi form in autumn, remain on the trees over winter, and come to maturity in June and July. This crop contains many male flowers and gall flowers, but no true female flowers, as seeds have never been found in this crop. The time of maturity is June and July.

The mammoni appear in June or earlier, and mature in July and August, according to climatic conditions. They contain both male flowers and female flowers, and a large number of gall flowers. The mamme or wintering figs produce male flowers and numerous gall flowers, but no female flowers. The female flowers are thus found only in the mammoni.

The various crops of the caprifig do not always succeed each other continuously. There is frequently a lapse of time between the falling of the profichi and the appearance of the mammoni. No account has here been taken of the female caprifig tree, as yet almost unknown.

Characteristics of the crops of the edible fig.—As to the edible figs the different crops are different in size, quality, flavor, sweetness, and sometimes in color. The first crop, the fiori, figues-fleurs, figos lampas, brebas, etc., are large figs, not very sweet, but pulpy and luscious for eating fresh, and they are highly prized on that account. The different names given to these large figs indicate the value in which they are held. The difference is considered so important that, for instance, in Spain and Mexico the common people will insist that the "brebas" are not figs. In California, however, no great distinction is made as to the three crops. When fig culture becomes as important here as it now is in Europe and Asia, names may be required for the first crop of edible figs. We have already proposed for the first crop the name "brebas," now used in all Spanish-speaking countries, breba meaning early.

A large number of figs do not produce any first crop or brebas, some give very few, and others again, like the San Pedro, produce only brebas, the second crop only maturing any figs when it is caprificated.

The second crop, known in France as "figues-ordinaires," in Spain as "higos," in Portugal as "vendimos," and in English-speaking countries only as "figs," need here no special reference. It is this crop alone which is used for drying in Smyrna or in other foreign fig-growing countries, as well as in California. These figs are sweet or very sweet, and, compared with the brebas, much smaller in size. In Italy a difference is made as to the first or lowest figs of the second crop, which are called pedagnuoli or low figs, while the later or upper figs on the same branches are considered less valuable and are known as cimaruoli or top figs. In the edible figs the third crop

can not be said to exist as a separate crop, as the last figs are only a continuation of the second crop. The fig tree often continues to bear until frost sets in, or until the tree becomes otherwise dormant. Some fig varieties, like the Natalino, ripen their last figs in midwinter, if properly protected.

If we compare the crops of the caprifig tree with those of the edible fig, we find that the first crop or *profichi* of the caprifigs correspond to the *brebas* of the edible figs, the *mammoni* of the caprifigs correspond to the second crop of the edible figs, and the *mamme* of the caprifigs to the winter figs of some of the edible kinds. The difference is, however, that while the *mamme* come to maturity the following spring, the third crop or autumn figs mature, if at all, the same year. The *mamme* correspond thus to the Italian *cimaruoli* or end figs, the location of the figs being characteristic both in the caprifig and in the edible fig. The *mamme* are so named on account of their large size and swollen form—resembling *mammæ* or breasts.

POLLINATION.

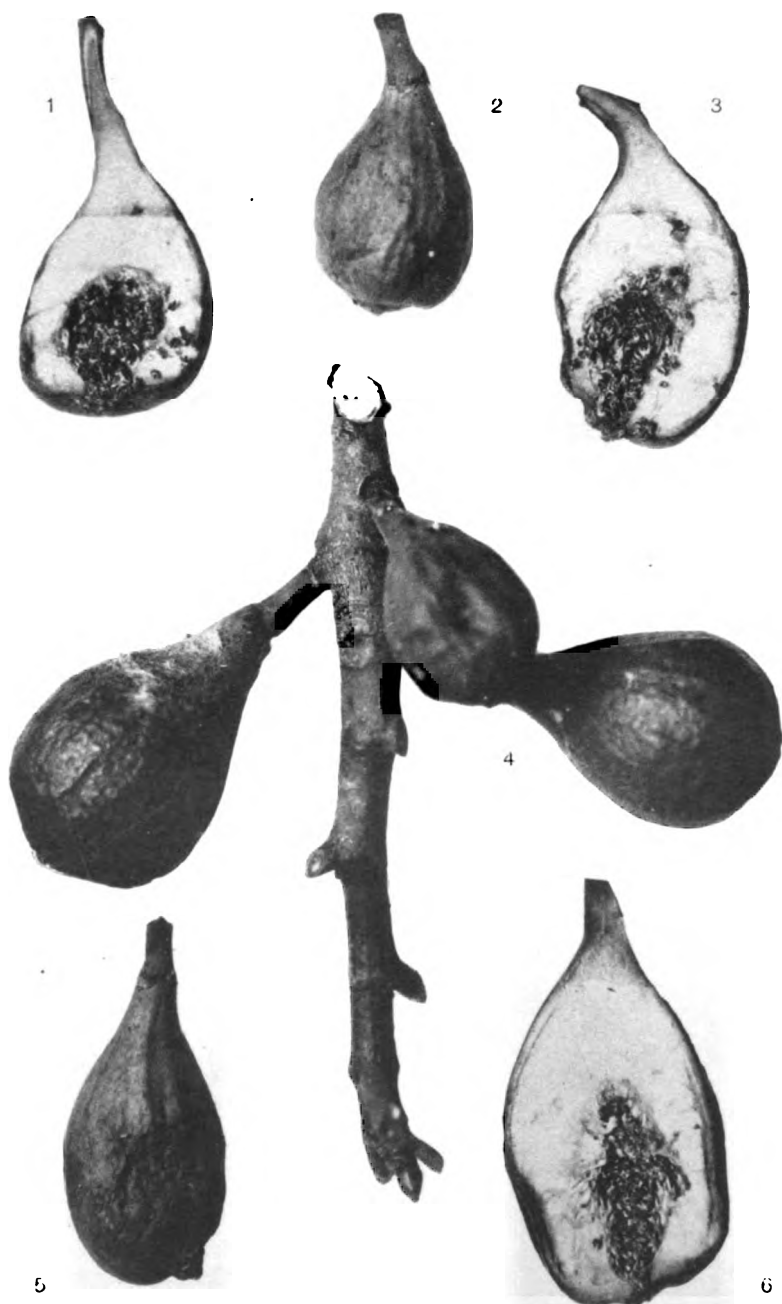
Pollination is the process in which the pollen produced by the anthers is placed on the stigma of the flowers. This process of fecundation or pollination is necessary in order that the ovary may be fertilized and produce seed. The pollen grains, when ripe, appear to the unaided eye as a fine dust, but under the microscope each grain may be seen to be beautifully and characteristically sculptured. These pollen grains are brought onto the stigma either by wind, transmitted by insects, or fall by gravity. As soon as the pollen grains are on the surface of the stigma—provided the latter is in proper receptive condition, neither too old nor too young—they begin at once to grow, sending out one or more pollen tubes, like long roots, which penetrate through the style and, following its canal, finally through the funnel-shaped opening in the ovule, reaching the inner nucellus. The fertilization has then taken place, and immediately afterwards changes take place in the ovule and nucellus, which in short time lead to the production of a fertile seed. As a rule we find that in the same flower the pollen grains and the stigma are not fully developed at one and the same time. It is therefore evident that the pollen in a flower can not be useful for fertilizing the ovary in the same flower. This is nature's remedy against self-fertilization, requiring that the pollen be brought from some other flower or from some other tree of the same kind. In the majority of flowers the pollen can be transported from one flower to another only by means of insects, and often the flowers are so peculiarly constructed that only a certain kind of insect can reach the pollen, or, rather, can reach the honey glands at the base of the anthers, as without the presence of these glands the insects would have no occasion to visit the flowers, which in such a case would remain sterile.

Nearly every flower we see in the field, and certainly every bright-colored flower, requires the visit of some insect in order that its stigma may be fertilized by the pollen which adhered to the insect when it left the last flower visited. Thus the insects and the flowers stand in close intimacy. The honey glands of the flowers furnish food for the insects, which are attracted to the flowers by their size, color, or scent, or by the odor of the honey. The insects pay for their visit and for their meal by unknowingly carrying the pollen from one flower to another—the insects are fed, the flowers pollinated. Only in very few instances do the insects live and breed in the flowers. One such instance is the fig, in which the *Blastophaga* wasp breeds and passes nearly its whole life. Caprification is therefore nothing but a similar pollination—one which, as regards the edible fig, is accomplished not only by the aid of insects, but also by the help of man.

Among other plants which require help in pollination in order to bear fruit or berries are certain varieties of strawberries, which possess only pistillate flowers. Such varieties will bear only when there are other kinds present to supply the pollen. In order to accomplish this pollination the horticulturist plants bisexual varieties alternately among rows of the pistillate ones. The wind and insects then carry the pollen from one variety to another, and pollination is accomplished. The flowers of the strawberry are open, and any insect almost can effect the necessary transmission of pollen. If the strawberry flowers had been hidden in a receptacle it would probably have been necessary for the horticulturist to breed and supply the proper insect. In caprification man furnishes these insects, the work consisting in bringing them from the wild figs to the cultivated ones. Another well-known process of pollination by the aid of man is the one practiced by the growers of the date palm. There are male trees and female trees of the date. The former produce only pollen-bearing flowers; the latter carry only seed or pistillate flowers. The process of pollination of the date palm consists in bringing small bunches of ripe pollen-bearing flowers to the top of the seed-bearing trees and shaking the pollen over the bunches. The staminate flowers are thus fertilized and the production of an abundant crop is assured. If this process is not undertaken by the grower, only a small crop would result, as insects and wind would fertilize only by chance and only a few flowers would bring fruit. In caprification of the fig man can not shake out the pollen on the flowers of the fig, because they are covered up. He can only suspend the pollen-bearing figs in the trees and let the *Blastophaga* wasps do the work of carrying the pollen through the eye of the fig to the female, or pistillate, figs. In caprification, therefore, we need not only pollen-bearing figs, but we require also an immense quantity of wasps to do the work of carrying the pollen. This complicates the process considerably, but in reality

DESCRIPTION OF PLATE IX.

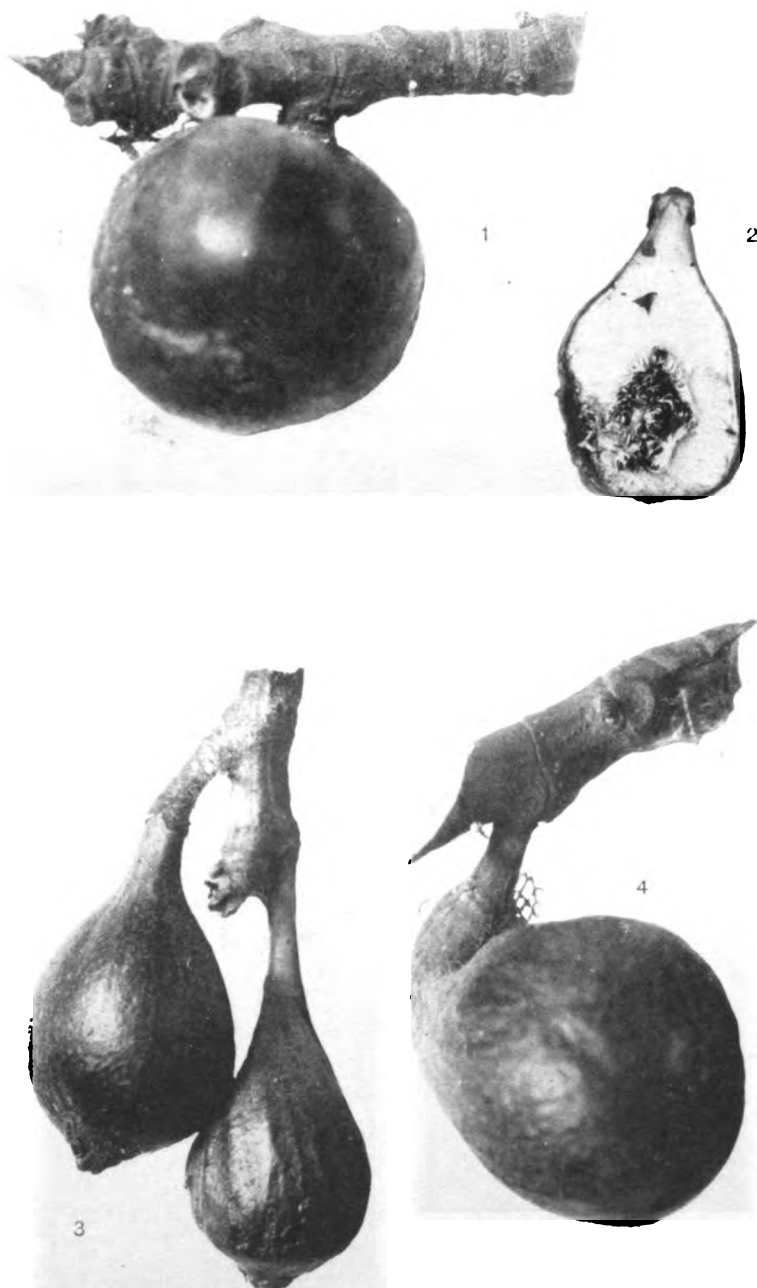
Polleniferous Caprifigs from a Caprifig tree from Dalmatia, grown at Niles, Cal. Three of the Figs (figs. 1, 3, 6) are cut in order to show the floriferous cavity with male-flowers and degenerate gall-flowers. (Photograph by Dr. P. S. Bruguere.)



POLLENIFEROUS CAPRIFIGS: A DALMATIAN VARIETY.

DESCRIPTION OF PLATE X.

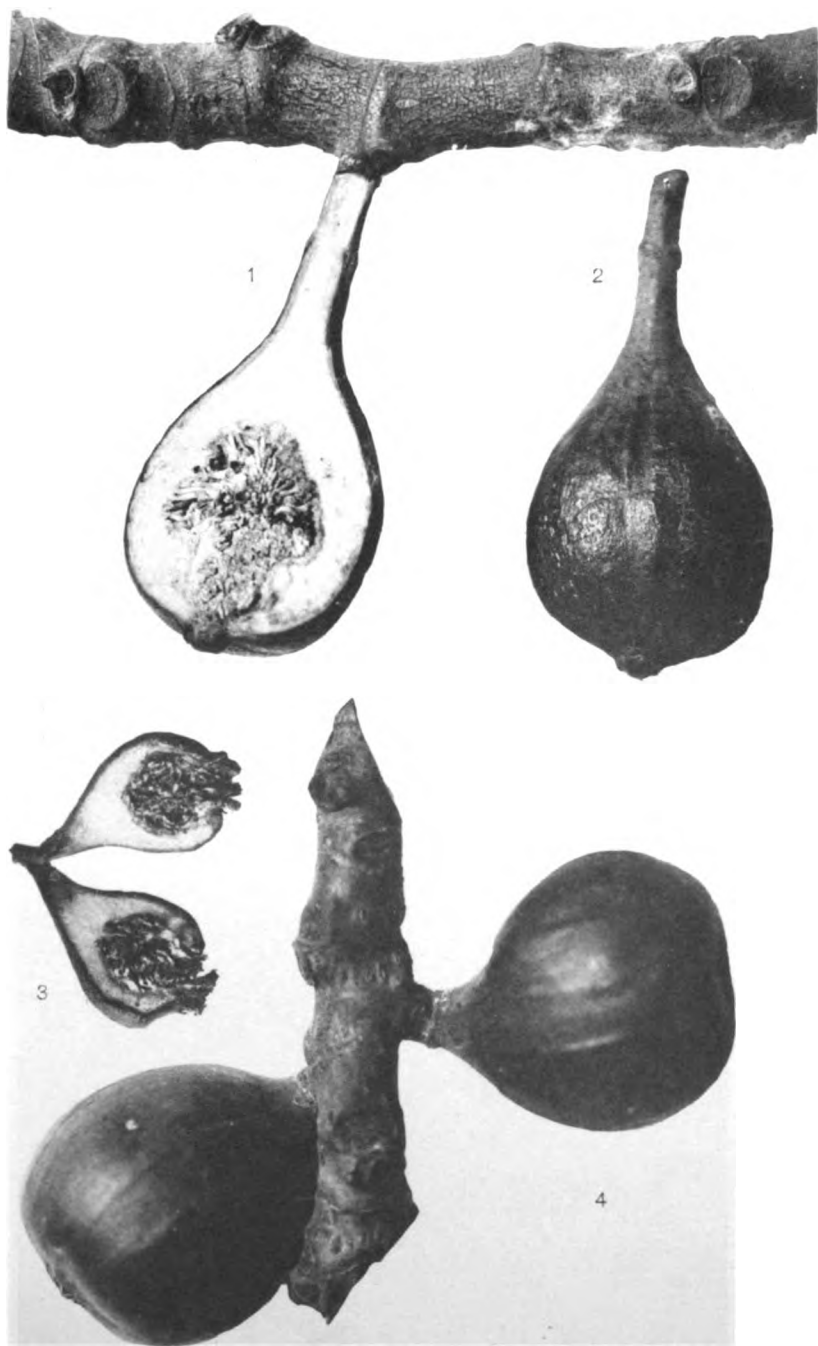
Fig. 1, an Insectiferous Caprifig, Italian variety. Fig. 2, Polleniferous Caprifig of the same tree cut in half. Fig. 3, a branch with two Polleniferous Caprifigs from same tree as the two last ones. Fig. 4, Insectiferous Caprifig, Italian variety, different from last ones. All grown at Niles, Cal. (Photograph by Dr. P. S. Bruguiera.)



INSECTIFEROUS CAPRIFIGS: ITALIAN VARIETIES.

DESCRIPTION OF PLATE XI.

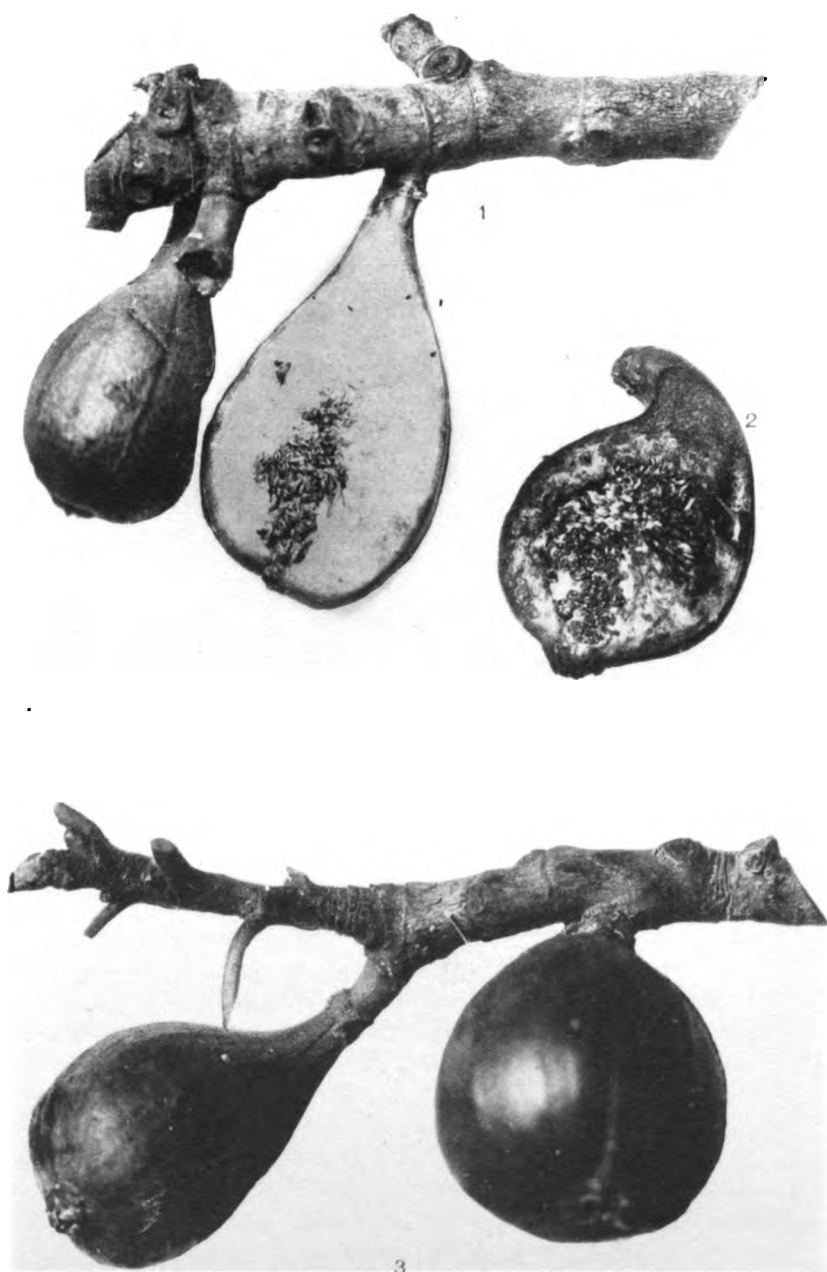
Figs. 1, 2, Caprifig branch with a cut Insectiferous Fig, Dalmatian variety. Fig. 3, a small mature Polleniferous Fig from the same tree. Fig. 4, a branch with two Insectiferous Caprifigs not quite fully developed. Italian variety, grown at Niles, Cal. (Photograph by Dr. P. S. Bruguere.)



INSECTIFEROUS AND POLLENIFEROUS CAPRIFIGS:
DALMATIAN AND ITALIAN VARIETIES.

DESCRIPTION OF PLATE XII.

Fig. 1, a branch with Polleniferous Caprifigs, Italian variety. Fig. 2, Insectiferous Caprifig, from the same tree, cut in half in order to show the zone of gall-flowers. Fig. 3, a branch with one Insectiferous Caprifig and one Polleniferous fig, Italian variety, grown at Niles, Cal. (Photograph by Dr. P. S. Bruguiera.)



POLLENIFEROUS AND INSECTIFEROUS CAPRIFIGS: ITALIAN VARIETIES.

its nature is the same. Every botanist understands fully the importance and nature of pollination, and we could multiply instances of its practical necessity in horticulture.

POLLENIFEROUS AND INSECTIFEROUS CAPRIFIGS OR POLLEN-BEARING AND INSECT-BEARING FIGS.

We have already stated that caprifigs require the presence of the *Blastophaga* wasps in order to produce seeds, but in order to produce ripe pollen-bearing figs it seems that the wasps are not necessary. A caprifig tree which is only partially caprificated possesses two distinct kinds of figs, which differ both in size and form. Mr. E. A. Schwarz, of the Division of Entomology of the Department of Agriculture, at Washington, who studied this question at Fresno during the summer of 1900, has named these respective figs, according to their nature, polleniferous and insectiferous—names which, as being eminently suitable, will probably be generally adopted. Before caprification has taken place—that is, before the new crop of wasps has entered the small caprifigs—these two kinds of figs are of the same size and form, generally the size of a large pea. But after the wasps have entered certain of the figs a difference begins to appear between those figs which have received the wasps and those which have not been entered. This difference extends not only to the figs, but to the branches bearing them. Thus all branches which bear caprificated figs start to grow more vigorously than those which do not possess caprificated figs. The latter remain puny, and even their leaves are smaller than those of the caprificated branches. (Pl. X.) A single caprificated or insectiferous fig will give character to the whole branch on which it grows. The polleniferous figs remain smaller and more oblong, and soon assume a yellow color. They become soft and appear partly mature, and soon fall off at various stages of growth, not remaining on the tree as long as the insectiferous figs. When cut open, it is found that the central floriferous cavity is comparatively small, but contains a large number of pollen-bearing flowers, which may or may not attain maturity. The meat is generally white or yellowish, and no violet-colored zone surrounds the flowers. The meat itself is soft and spongy, slightly moist, but rarely juicy. The gall flowers are shrunken and diminutive.

The twigs bearing insectiferous figs are longer, thicker, and in every way stronger. (Pls. X, XI, XII.) Each twig may contain both insectiferous and polleniferous flowers, a single one of the latter being sufficient to impart an unusual vigor to the twig. This vigor extends even to the leaves. The insectiferous fig is thicker, harder, and of a deep green. It is also more round and turbinate and sticks strongly to the twig. It has to be cut away and does not fall at the touch as the polleniferous figs do. The exterior is coarser and the

ribs strongly marked. If such insectiferous fig is cut through it is found that its meat is hard and peculiarly solid and possessed of a more or less thick but always distinctly violet-colored zone immediately surrounding the flowers. The flower core is much larger than in the polleniferous figs. The male flowers are strongly developed and so is the zone bearing the gall flowers, several hundreds of which may contain *Blastophagæ* in some stage of development. The inhabited gall flowers are readily recognized by their plumpness and size, and when in an advanced stage of development the dark shade indicates that the wasp is near its final size and may be expected soon to issue from its confinement.

This distinction between the insectiferous and the polleniferous caprifigs is of great practical importance to the horticulturist, as it enables him to readily recognize the one kind from the other. It is only the insectiferous caprifigs which are used in caprification. The polleniferous figs which do not contain *Blastophagæ* are useless in caprification, and should accordingly not be suspended in the Smyrna fig trees.

The above descriptions and notes were made from caprifigs grown by Mr. John Rock at Niles, Cal.

THE FIG AND THE CAPRIFIG.

It is now generally conceded that the edible fig is in some way descended from the caprifig.¹ The caprifig is the wild fig of the Mediterranean region, though its original home must be searched for in the mountain regions of southern Arabia. From its original habitat the caprifig tree was spread by cultivation, or at least by transplantation to other districts, and finding suitable conditions, soon established itself as a wild tree in the forests and mountains of the respective countries suitable to multiplication through seedlings. It is now generally known to botanists that the caprifig carries figs which contain three distinct kinds of flowers—male, female, and gall flowers—all in the same fruit, as will be described later on. But, besides, it is also known² that there exists also a caprifig tree which bears mammoni which possess only pistillate and gall flowers, though trees of this kind are comparatively very rare. Cuttings taken from either one of these

¹ Both varieties are known as *Ficus carica* Linnæus, and belong to the same botanical species.

² Pontedera, p. 175. This female tree he calls *Erinosyce*. Galesio also mentions such tree under the name of *Fico semi-mula*, but it is uncertain if he himself has seen it. A somewhat similar form of the caprifig is described by Solms-Laubach, p. 35, as having grown wild in a garden at Chiaja, near Naples. As all, or at least nearly all, other fig species which have been particularly described possess such an exclusively female form, it is more than likely that Pontedera's description is correct. Müller and Solms-Laubach assume that the edible fig is the female tree and the caprifig the male tree, which I can only understand to mean that the edible fig is descended from the female tree.

trees would produce only its kind, though seedlings might produce both kinds, but probably the majority of the offspring would be like the parent tree.

Through cultivation and selection by man numerous types of the caprifig tree have been originated, though they are not at present well understood or described. The Italian botanist Pontedera, and after him Galesio, were the first to mention this fact, and although other botanists have neglected to verify and through observations enlarge upon Pontedera's and Galesio's reports, we have no good reason to doubt that their ideas were in the main correct. Galesio describes¹ the purely female tree of the caprifig as "*Fico semi-mula*." In general he recognizes among the caprifig the following types:

Fico selvaggio, or common wild caprifig, with two or three crops a year.

Fico della natura, the original wild caprifig, with only one crop a year, this crop developing during the summer and ripening in the fall.²

Fico mostro, all caprifigs which bear no fruit or which drop all their figs while they are yet young; also trees in which only the male flowers arrive at development.

Fico mula, with female flowers, which do not develop fertile seed, and which, as he expresses himself, become pomologically but not botanically ripe.

Fico semi-mula, with no male and with only female flowers, which, when pollinated, become botanically ripe, and consequently also pomologically ripe. This fig is undoubtedly the female tree of the caprifig. From the descriptions of the other kind we may at least conclude that there exist numerous races or variations among the caprifigs.

At present we possess in California about a dozen varieties of caprifigs, differing from one another very much in the same way as do the varieties described above, as well as in other minor points, such as variations in leaves, size and color of fruit, time of maturity, number of crops, etc. Several of these varieties are necessary in every fig orchard where caprification must be practiced. The importance of growing several different varieties of caprifigs in one orchard can not be overestimated, as it will certainly be found that one variety which will be suitable in one place will be a failure in another; besides, some varieties bear only one or two crops of figs, while three crops are necessary. Home-raised seedlings should therefore be resorted to, as they are likely to produce varieties suitable to the locality where they are

¹Galesio, p. 46. Solms-Laubach doubts the correctness of these descriptions and calls them most artificial, p. 33.

²According to Solms-Laubach, there is absolutely no foundation for this description, p. 33.

to be grown. The principal feature of a good caprifig orchard is that there should always be figs of a proper size to receive the wasps whenever they hatch out. If such figs are wanting the wasps will die, as they can not live for any length of time outside of the fig. There must be a crop of caprifigs for every crop of *Blastophaga* wasps. The female wasps are fertilized before they leave their galls in the figs, and are immediately ready to lay their eggs in young caprifigs. The failures experienced in California in establishing *Blastophaga* colonies on the caprifig trees growing there were partly due to lack of figs of proper size. The wasps were brought over from Asia Minor without any difficulty, but upon their arrival the caprifigs possessed only large figs, none of the size suitable for the wasps to breed in. The fact that some caprifigs do not produce any fertile seeds, although they have both perfect male and female flowers, results from the fact that, as in the edible fig the male flowers shed their pollen first long after the female flowers have passed their state of receptivity. Such caprifigs must be caprificated, just as edible figs, in order to produce seeds.

THE FIG.

The fruit which we call a fig is really not one single fruit, but a large number of fruits (or flowers) placed on a common receptacle. The fig itself is this receptacle, and in its interior are seen the small fruits or the flowers if the fig is unripe.

If we cut open a fig lengthwise we see first, exteriorly, a fleshy, homogeneous mass, the receptacle proper, inclosing a central hollow, which connects with the outside through a narrow passage at the eye. Lining this central hollow on the inner surface of the receptacle are seen an almost innumerable quantity of small, apparently similar flowers, which are fleshy, of even size, and a little deformed, and which apparently only slightly resemble flowers with which we are generally acquainted. These are, however, the true flowers of the fig. They fill the whole interior surface of the receptacle, except close to and at the "eye," where they are replaced by scales or small leaflets, which latter interlock and form a thatched obstruction in the throat of the fig. This is generally the appearance of the fruit of the common or edible fig tree.

The wild fig or caprifig is somewhat differently constructed, a difference, however, which is of the utmost importance and interest.

In the caprifig we find, besides the scales at the eye and in the throat, not less than three different and distinct flowers covering the interior of the receptacle—male, female, and gall flowers. The male flowers occupy the place nearest below the scales of the throat, while the lower parts of the receptacle are filled with gall flowers and a few female flowers. The proportion of these flowers is different in the different crops of the figs. The hibernating "mamme" or third crop possesses male flowers and many gall flowers, but no female flowers.

The first crop or "profichi" has both male flowers and gall flowers, but no female flowers. The second crop or the "mammoni" alone possesses both female flowers and gall flowers. There are, however, exceptions to this rule, but this proportion is the most common one and is generally constant. There is also a purely female plant of the wild caprifig which possesses mammoni with only female flowers, but this plant is as yet almost unknown. It has already been mentioned that this form was first described by Pontedera.¹ The different crops of the fig will be more minutely described presently.

If we consider the fig pomologically it will be seen that, as it is principally the receptacle that is eaten, the various flowers found in the fig often detract from the value of the fig, as they are never as juicy as the receptacle part. Especially is this the case with the male flowers, which are never edible; and whenever they occur they must be cut away before eating.

THE MALE FLOWERS.

The male or staminate flowers of the caprifig are, as just stated, situated immediately below the throat of the fig, variously occupying from one-half to two-thirds of the space in the receptacle. (See fig. 9.)

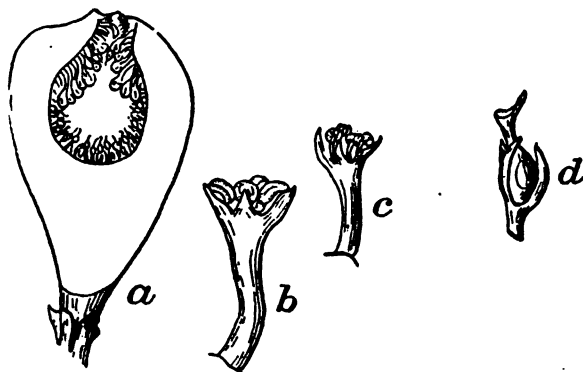


FIG. 9.—Caprifig from Smyrna growing at Niles, John Rock orchard: *a*, fig cut through from stalk to eye; *b*, *c*, male flowers; *d*, gall flower.

The flowers, though small and sometimes somewhat irregular, are still perfect. They possess four petals, generally shorter than the anthers, and shorter than those of the female flowers. Inside these petals are seen four stamens carrying larger pollen-producing or pollen-bearing anthers.

In the first crop these stamens attain their full development in the months of June or July, according to locality, or about two months after the time that the female flowers have reached their perfection in the same fig. It is evident, therefore, that in usual cases the pollen

¹ The female tree of the fig was first scientifically described by Solms-Laubach in species from Java. See his *Die Geschlechtesdifferenzirung der Feigenbäumen*.

from the anthers can not fertilize or pollinate the female flowers in the same fig. Their function is to pollinate the female flowers of the succeeding crop. Thus the pollen from the first crop or "profichi" pollinates the "mammoni" or second crop, the female flowers of which are in their prime and receptive at a time when the pollen of the profichi is ripe. The pollen in the profichi is very abundant, of a pale yellow color, resembling a flowery yellow powder, which may easily be taken out and collected without injury to its vital qualities.

The above refers only to the caprifig, or, if we wish to be more distinct, to the male tree of the caprifig. The edible fig, as cultivated in our orchards, does not possess any male flowers,¹ except in extremely rare cases, as will be mentioned below. (See fig. 10.)

The anthers in the male flowers are not always properly developed. This is especially the case in seedlings raised from Smyrna fig seeds, which originated from a pollination with the caprifig. Such seedlings do not all possess male flowers; those that do are more or less similar

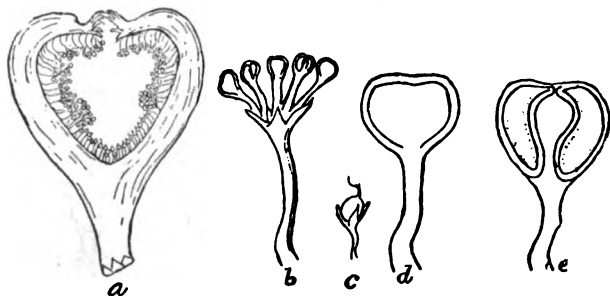


FIG. 10.—Seedling fig raised by the author from caprificated Smyrna figs: a, fig cut in half, showing interior cavity with male and gall flowers; b, male flower; c, gall flower; d, e, stamens with anthers.

to the caprifig flowers, the anthers frequently being as well developed as in the real wild fig.²

FEMALE FLOWERS.

In the caprifig, female flowers have been found with certainty only in the second crop or mammoni. In this crop alone have fertile seeds been found, but always in very small quantities, hardly more than one fertile seed in every fig.³ In the edible figs perfect female flowers capable of producing developed embryos are more common. Generally it has been supposed that all flowers found in the edible figs

¹ As will be seen in a different place, so far only a very few exceptions have been noted, among them the Cordelia fig in Solano County, Cal., and the Croisc fig, growing at the mouth of the Loire River in France. See Solms-Laubach, I, p. 14.

² French authors generally describe the caprifig male flowers as having only three petals, which is an error, undoubtedly originated by describing the figure in "De Breuil," where the figure of the male flower is erroneously drawn.

³ Solms-Laubach, I, p. 11, found only twenty fertile seeds in forty caprifigs (mammoni). Gasparrini, I, p. 328.

were female flowers capable of producing fertile seeds. But this is undoubtedly not the case. All flowers of the edible figs in a general way resemble the female flowers, but, as will shortly be demonstrated, they are not all alike, but differ in the various crops and in different varieties. (See figs. 11, 12.)

In the second crop of the genuine Smyrna figs nearly all flowers are perfectly developed female flowers, which only require pollination in order to bring fertile seed. This appears also to be the case in San Pedro and other

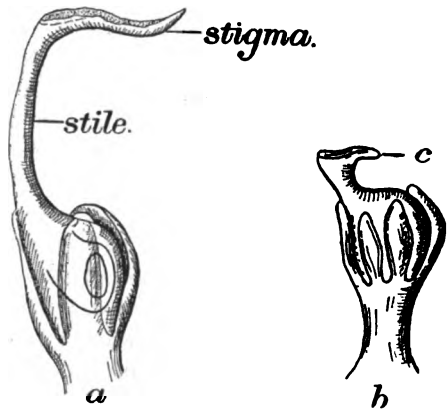


FIG. 11.—*a*, Female fig flower with perfect stigma; *b*, gall flower with imperfect and greatly shortened stigma, adapted to the use of the wasp. From caprifig.



FIG. 12.—*a*, Perfect female fig flower from second-crop San Pedro; *b*, its receptive stigma. The second crop of San Pedro matures only after caprification.

figs, which regularly drop their second-crop figs. As far as microscopical structure is concerned their flowers are entirely similar to those in the genuine Smyrna figs. That common edible figs possess at least some female flowers is clearly demonstrated by the finding of fertile seed in many such figs in localities where caprifigs are grown spontaneously. But the small quantity of seeds found in common figs indicates that the quantity of perfect female flowers is small.

In places where caprifigs are not growing wild—that is, where they are not growing spontaneously from seed, it is very difficult to decide whether a flower is a true female flower or not, and the only practical way to ascertain it is to pollinate it and await the results of fertilization. A wild caprifig always indicates that pollination is taking place through the agency of wasps, as even the caprifig will not propagate itself spontaneously from seed and become wild without their agency, as the pollen can not be transferred by the wind either to the female flowers of the caprifig or the edible fig.

As regards the structure of the female flowers, some slight variation is noticeable. The petals are generally four in number, but sometimes three or five. According to Solms-Laubach, the number is quite variable within the above limits, but, according to my own observations,

four is the most constant number. In size the petals vary somewhat, one pair often being a little longer than the other, and all four are always longer than the petals of the male flowers. All are more or less fleshy, and sometimes they are furnished with short hairs at the margin. In the center, between these petals, projects a single pistil, enlarged at the base, forming the ovary. The central part is elongated two or three times more than the ovary. This part is the style. The upper part of the style is bent and funnel-shaped, often, or perhaps generally, divided, one projection of the stigma being longer than the other. With a high-magnifying lens the margin and upper surface of the stigma are seen to consist of a layer of minute glands, of a warty appearance, while from the center of the stigmatic funnel there extends downward a narrow canal or lumen, which passes through the whole length of the style and down through one side of the ovary, here bending upward and touching the very embryo. When the female flowers are receptive—that is, when they are in condition to receive the pollen from the male flowers—these glands become greatly swollen and somewhat glossy, of a green or light-green color, which, after the receptive stage is passed, changes to a bright brown. The inner surface of figs in such a stage is seen to be spotted brown when cut open. The stigma attains its receptivity long before the male flowers are ripe in the same fig receptacle. This difference in the maturity of the flowers makes it impossible for the female flowers to be fertilized or pollinated by the male flowers of the same fig. Thus the female flowers of the *mammoni* can be pollinated only by the male flowers of the preceding crop—the *profichi*.

The crops of the edible figs correspond in a general way with those of the caprifig. Thus when the male flowers of the *profichi* are ripe, and at a time when the other flowers in this fig had passed their prime months before, the female flowers of the second-crop *Smyrna* figs have just attained the state of receptivity. They can therefore be pollinated by the male flowers of the *profichi* of the caprifigs. The time for this pollination is June or July, according to climatic conditions, in various countries. This rule as to the difference in time of ripening of the male and female flowers in the caprifig holds also good in the few instances where male flowers have been found in the edible figs. Hence the impossibility of the female flowers in our edible fig being fertilized by the pollen of the male flowers immediately above them. It is only the female flowers of the following crop that could thus be impregnated by the pollen. Female flowers occur in large numbers in the *Smyrna* varieties and in the first crop of such figs as the *Adriatic*, which do not mature this crop without caprification.

THE GALL FLOWERS.

The gall flowers, which occur in abundance in all caprifigs of all crops, are in reality nothing else than female flowers which have been transformed in order to accommodate the requirements of a small

wasp—the *Blastophaga grossorum*. These gall flowers do not produce seed, though in general aspect they resemble the female flower.

The petals in the gall flowers are smaller and more unequal in size. The chief difference, however, between these flowers and the female flowers is found partly in the style of the pistil, which is not so elongated as in the female flowers, and partly in the stigma, which is very much smaller and entirely wanting the glands on its upper surface. The gall flowers can not be pollinated, or, if they are, the pollen does not develop pollen tubes, nor does the embryo or egg in the lower parts or ovary become fertile. A comparison of the figures of the gall flowers and female flowers will show the points of difference and resemblance. (See figs. 13 and 15.)

While it is true that the gall flowers do not produce seed, it is a fact that they develop to a certain extent if punctured by the wasp, or, more correctly, if the egg of the *Blastophaga* wasp has been properly deposited. They then develop into galls—that is, the lower part of the stigma swells up and the integuments of the embryo sac harden, forming a glossy and brittle covering as a protection for the larvæ of the wasp.

Those gall flowers which are not thus wounded by the *Blastophaga* egg do not develop any further, but at once wither and shrink up. Gall flowers are found in all wild-fig species, though in some

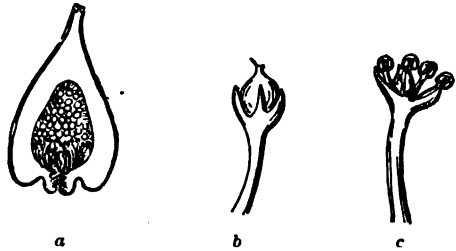


FIG. 12.—Seedling from seed of imported Smyrna figs raised by E. W. Maslin, cut May 15, 1893: a, longitudinal section of fig; b, gall flower; c, male flower.

species their nature is not apparent until the egg of the *Blastophaga* has been laid. In the edible fig no gall flowers have been found with certainty; at least the *Blastophaga* wasp, for whose special benefit these gall flowers seem to have originated, has never been found breeding in the edible figs. It has been supposed that the cause of this was to be found in the sugary juices of the edible fig, which killed the eggs or embryo of the wasps, but I am satisfied that this is not exactly true. Many varieties of wild-fig species produce very sweet fruits, edible and quite palatable, and still these figs serve as homes for *Blastophagas*. The cause of the inability of the wasp to breed in common figs must be sought for elsewhere, and, as I will presently point out, is due to the fact that the edible figs contain only flowers modified to such an extent that they are unsuitable as breeding places for the wasps.

The gall flowers are characterized by a much shorter style, by an undeveloped stigma devoid of receptive glands, and by an imperfect embryo which never develops to more than a certain limited degree. The discovery of the distinction between gall flowers and female flowers is due to Solms-Laubach.

Until his researches were made known it was supposed that the female flowers turned into galls when stung by the wasps. He again proved that the distinction existed independent of the wasps, which, however, select the peculiar gall flowers as the only ones suitable to receive their eggs.

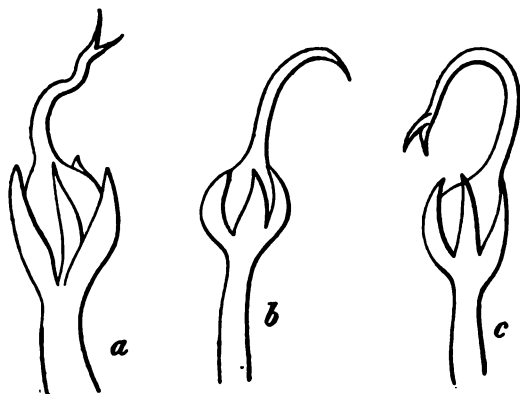


FIG. 14.—Mule flowers from the first crop, San Pedro. This crop matures without caprification.

MULE FLOWERS.

Under this name I arrange the majority of the flowers of that class of edible-fig varieties which mature their figs regularly without the presence of the caprifig and its pollen. These

flowers are, as far as I know, not found in the caprifig, nor in any other wild-fig species. They are undoubtedly a product of culture and must be considered either as modified gall flowers (figs. 14, 15), which, bereft of the *Blastophaga* influence, have partially regained their original structure, but which, just on that account, have lost the capability of producing galls; or they may be considered as degenerated female flowers which have lost their fecundity by inertia—in other words, by not being pollinated for ages, so to say—in the same way that many cultivated flowers have degenerated. I am inclined to consider the latter as the more probable, though at present no direct proof can be given. That the great majority of the flowers in our edible figs (except the *Smyrna* race) are different from the true female flowers, both in structure and nature, is undoubted, whether we assign as a cause one or the other of the above theories. These mule flowers never reach any botanical maturity, and

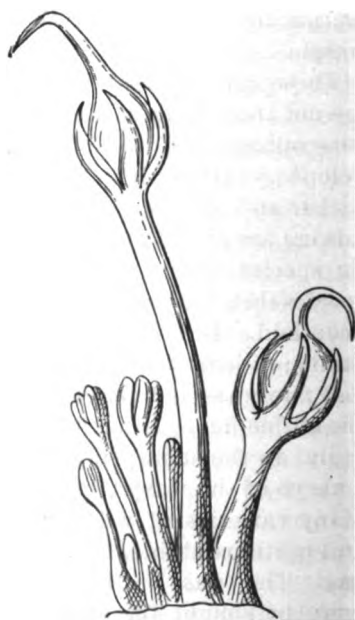


FIG. 15.—Five undeveloped mule flowers and two developed mule flowers from the second crop of Adriatic figs. This crop develops without caprification.

are really something halfway between the true female flower and the true gall flower.

The mule flowers are characterized by an imperfect stigma, by a style in length intermediate between that of the gall flower and the female flower, by an imperfect embryo, and by the property of becoming fleshy, sweet, and edible without pollination. I have so far not found any in the Smyrna figs, comparatively few in the second crop of the San Pedro class, but almost exclusively occurring in the first crop of this class. The stigma of the mule flowers has no developed glands on its upper surface and is not receptive.

MALE FLOWERS IN EDIBLE FIGS.

It has frequently been stated that male flowers are not found in edible figs, and this must be considered as a rule. However, there are some exceptions to this rule, and as they are of great interest, if not to the grower at least to the student, it may be proper to mention the subject somewhat more in detail.

The male flower of the fig was for a long time unknown to botanists, and, strangely enough, it was first described from specimens found in the edible fig. The male flower of the fig was first described by the prominent botanist La Hire, in the year 1714, from figs grown in Paris either under glass or in the open ground.¹ Unfortunately, La Hire does not give particulars as to the variety from which the flowers were taken, and it is not even certain that La Hire got his flowers from the edible fig. Another variety of edible fig which regularly produces seed is the "Croisic," cultivated in the vicinity of the ocean bathing place Croisic, on the coast of Brittany, in the department of Loire Inferieure. This fig has been mentioned by Solms-Laubach,² and described as being green when ripe, with white or pale pulp, very juicy and sweet, but with poor aroma. The male flowers occupy the same place and distribution as in the profichi of the caprifig. The place they occupy on the receptacle ripens less perfectly than the balance of the fig, and remains always somewhat hard and dry, generally to such an extent that it becomes necessary to remove that part of the fig before eating.

Another somewhat similar edible fig was observed by the same author as cultivated at Cherbourg, in France; also on the Atlantic coast. The male flowers in this fig were, however, degenerated or improperly developed. The finder of these figs believes them to be only highly developed caprifigs which have become edible. He is even tempted to trace their introduction to France to the time when

¹ La Hire, p. 287. But Colin Milne was the first one to point out that the cultivated figs contained no male flowers—only what he supposed to be female flowers. (1770.) See Milne's dictionary, article "Caprification."

² Solms-Laubach, 1, p. 14.

the Phœnician traders extended their ocean voyages to the northern coast of France—a time when supposedly the common edible figs were yet in a semiwild or undeveloped condition.

THE CORDELIA FIG AND THE ERINOCYCE.

The only certain instance of male flowers having been found in an edible fig in California is that which I am about to mention.

In July, 1893, I found a box of figs in the market of San Francisco, marked as having come from Cordelia, in Solano County, containing very large yellow figs, a size larger than our largest Adriatic. Upon opening these figs I found every one with a fully developed zone of male flowers, fully ripe, and with an abundant, perfectly developed pollen. In other respects the figs resembled very much the Italian Gentile, which is now also growing in California in various localities. These figs belonged to a distinct variety and were propagated as table figs, though the dry zone of male flowers greatly detracted from the quality of the fig. The fig was juicy and very sweet. It is not impossible that this fig is identical with the Croisie fig described by Solms-Laubach, and that it was brought here by settlers from Croisie, in France.

It may be stated that both myself and Mr. E. W. Maslin, of California, have raised seedlings of Smyrna figs. Some of those raised by the latter came to partial maturity at least, and contained male flowers in greater or lesser abundance. Such figs, however, must be considered as improved caprifigs—improved by being raised from seed of Smyrna figs. The Cordelia and Croisie figs are probably descendants from the male caprifig, having retained the male flowers, while they also have developed sweetness and juiciness to a greater degree than their wild parents. It is hardly to be expected that these figs will develop perfect seeds without the aid of the *Blastophaga*, as it is probable that they, as other figs, will bring their male and female flowers to perfection at widely different times; in other words, that when their female flowers will be receptive their male flowers will not yet have developed their pollen.

It must be clearly understood that edible figs possessing male flowers are inferior to those which do not possess any, and the presence of male flowers is without any value from a horticultural point of view. The *Blastophaga* can not live in those figs, because they do not possess perfect gall flowers; the pollen can not be utilized for pollination or caprification, because there is no practical way of getting it out of the fig and onto the flowers of the next crop; and finally, such figs are inferior for eating, as the male zone is dry and not eatable.

The fig known as *Erinocyce* is of great scientific interest, though not horticulturally valuable. Pontedera was the first to describe and name this rare variety. It is characterized as standing halfway between the caprifig and the edible fig. Its first crop possesses

male flowers as well as gall flowers with inquilines or wasps. This crop is not edible. The second crop contains perfect female flowers. Solms-Laubach, who has had opportunity to observe the mammoni or second crop of this fig, states that the mammoni possessed both female flowers with perfect embryos and gall flowers with wasps. This fig does not seem to be related to the Croisic or Cordelia figs.

In the caprifig we have three kinds of flowers: Male flowers, which, on account of the time of ripening of the pollen, can pollinate only female flowers of the succeeding crop; female flowers, which produce seed, but which, on account of the early time at which they are receptive, can be pollinated only by the pollen of the preceding crop; gall flowers, which resemble the female flowers, but which are at no time receptive, and which serve no other purpose than breeding places for the *Blastophaga* wasp. The female flowers of the caprifig are found only in the second crop or mammoni. The object of this restriction of nature is due to the fact that it is this crop alone which falls to the ground at a time when, on account of climatic conditions, seeds could germinate. The profichi as well as the mamme fall during the dry season, when no seeds would find the proper moisture to germinate.

VARIOUS KINDS OF MATURITY.

In the fig we can distinguish between botanical and pomological maturity. Gallezio was the first one to make the distinction, which is here adopted, somewhat modified, as being of particular use in demonstrating the nature of the fig. We find that some or most edible-fig varieties set and mature their figs without pollination, but that, as a consequence, such figs contain no perfect flowers with fertile embryos. This state of maturity may be called pomological maturity, as it does not necessarily require the botanical perfection of the flowers. Pomological maturity is attained by the great majority of edible figs, and is probably an inheritance from the caprifig, which becomes similarly pomologically mature. This pomological maturity is not necessarily accompanied by any botanical maturity, as, for instance, is proven by our California figs, which never contain any fertile seed unless caprificated.¹

The other kind of maturity may be called botanical maturity, as it requires the flowers to be perfectly developed, with perfect embryos, in order that the fruit may set and become also pomologically mature. If the fruit is edible or cultivated as a fruit, the pomological maturity will always be effected by the botanical maturity. The Smyrna figs can only attain pomological maturity by first being botanically

¹The fact that one tree has been found which produces male flowers, and according to the finder also seed, does not in the least detract from this theory. The Cordelia fig, as well as the Croisic fig, must be considered as a modified caprifig which has not yet lost its male flowers.

mature. But nearly all other figs become pomologically ripe without necessarily or generally being botanically ripe. Other figs again, like the San Pedro, produce a pomologically ripe first crop, but the second crop, which possesses perfect female flowers, does not become pomologically ripe, and can become botanically ripe only by pollination.

The pomological maturity usually indicates and implies a long-continued cultivation of the fruit by man, and relates chiefly to cultivated fruits. Among other fruits besides the fig which attain pomological maturity without botanical maturity at the same time we may mention some varieties of dates, one variety of pomegranate, the seedless orange, many apples and pears, the common edible banana, the pepino solanum of Central and South America, seedless grapes, and a number of other fruits and vegetables in which the seeds are abortive and have become so partly through the continued asexual propagations of the plant and partly from other causes. Botanical maturity is attained by all fruits which produce perfect seed, and if the fruit is edible it is also pomologically mature.

But it must be remembered that the fruits here enumerated as attaining pomological maturity are in general such as have been developed from pollinated flowers. Few other fruits than the fig are known to develop without previous pollination. The development of the common edible-fig receptacle must therefore be considered somewhat in the same light as the maturity and development reached by a tuber, or by the stems of the sugar cane, etc. Pomological maturity merely indicates that the fruit becomes edible, while botanical maturity means that the fruit has developed fertile seeds.

SEEDS IN SMYRNA FIGS.

We have already several times referred to the fact that all edible figs may be divided into two distinct classes or types—one which when ripe does not necessarily contain fertile seeds and one which can not become ripe without also containing fertile seeds, as otherwise it would not be ripe or mature. There are also other differences. The Smyrna figs belong to the latter class, and they always contain ripe and fertile seeds.

But as the cultivated Smyrna fig never contains any male flowers, and as caprification with the wild fig is always resorted to in order to cause the figs to mature, it is evident that the seeds thus produced must, when growing, give us hybrid plants—plants which more or less partake of both parents, the wild as well as the Smyrna fig.

Artificial pollination of figs is no new or remarkable discovery. Gasparrini relates how¹ he repeatedly introduced the pollen of the

¹ Gasparrini, l. c., under point No. 8. He says he impregnated artificially thirty flower heads on a Lardaro fig by introducing into the aperture the pollen of the caprifig. In California this experiment was first tried in 1890 by Mr. G. C. Roeding.

caprifig into edible figs, especially of the Lardaro variety. But his pollination produced no decided results. No increase in the number of fertile seeds was noticed, either because the flowers of the Lardaro variety were principally mule flowers, on which the pollen could have no effect, or because the female flowers had all been previously pollinated. From this Gasparrini draws the illogical conclusion, repeatedly quoted by later writers, that the caprifig is of a species different from the edible fig; that its pollen can not influence or fecundate the female flowers of the edible fig, and that consequently the practice of caprification is illusionary and of no value whatever. Gasparrini did not know of the class of figs which I have designated as the Smyrna type, and which, unlike any other class, produces principally receptive female flowers, which do not produce seed without the aid of pollen from the caprifig. Had Gasparrini had opportunity to extend his interesting and minute investigations to this class of figs, the conclusions to which he came would no doubt have been greatly modified.

SMYRNA FIGS IN CALIFORNIA.

The history of the Smyrna figs in California is intensely interesting, and directly bearing upon this point of the production of fertile seeds. Imported in 1880 (for details see the historical part) and quite extensively propagated and planted in the most dissimilar parts of California, these figs failed to bear a single ripe fruit during a period of ten years. The fruit would form in abundance, the flowers would develop and become apparently receptive, as shown by the glands of the stigma and the length of the style, but the fruit would invariably fall when apparently one-third or one-half grown. It was this fact, together with my observation that imported Smyrna figs always possessed numerous fertile seeds, while such were never found in our other edible figs, that made me a strong advocate of caprification, and which satisfied me that pollination was necessary and not illusionary, as almost everyone else¹ believed, principally on the testimony of Gasparrini and Olivier. It would indeed have been strange that Smyrna figs should not ripen their fruit in California, if the maturing depended only on climatic conditions or differences in soil. These figs, consisting of three distinct varieties, were planted in the most dissimilar localities and in greatly different soils, and exposed to varied climatic conditions found in the northern, central, and southern parts of California, in the interior valleys, in the foothills, and on the coast. All the Old World fig districts together would hardly show more variations in climatic and other conditions than did the various localities in which the Smyrna figs were tried in this

¹ As is customary with unpopular theories, the first remarks on caprification in California were simply sneered at, and at the best considered illusionary, and heated discussions were entered into.

State. Still not one tree properly matured a single fruit. A few of the first crop became half ripened—that is, became yellow and soft, but insipid, not sweet, and never attained a proper size or a size at all approaching that of the imported dried figs.

Acting on the principle that the want of success in producing Smyrna figs here was due entirely to the absence of *Blastophaga* wasps and to want of pollination, the writer began experiments in this direction in 1882 and was later joined in them by E. W. Maslin, of San Francisco. Some of these experiments are recorded in the author's *Biological Studies on Figs, Caprifigs, and Caprification*, published in the *Proceedings of the California Academy of Sciences*, 1895, and for particulars reference may be made to that work. It is enough to state here that there were produced numerous fully mature and perfect Smyrna figs on the imported Smyrna trees by simply introducing the pollen into the figs at a time when the pistillate flowers were fully receptive. Thus, once for all, was settled the question of the necessity and nature of caprification, and it was demonstrated that the want of success in producing Smyrna figs in California was alone due to the want of pollination by *Blastophaga* wasps. The author's experiments also demonstrated that the varieties of the first importation of Smyrna figs into California, the genuineness of which had been doubted by nearly everyone, were genuine. This collection, consisting of several hundred trees, was brought here by G. P. Rixford in 1880 and 1882, through the aid of Consul E. J. Smithers in Smyrna. On account of the persistent dropping of the figs the idea originated by the late Dr. Stillman became prevalent that these figs were not what they pretended to be, but simply wild figs sent us by the jealous Smyrna growers, who were afraid that our fig production would come into competition with their own products. On that account most of the "Bulletin"¹ figs were rooted out.

During the year 1900 the chief of the Entomological Division of the United States Department of Agriculture, Dr. L. O. Howard, sent one of his assistants, Mr. E. A. Schwarz, to Fresno and Niles, Cal., to pursue studies in connection with caprification. During his investigations Mr. Schwarz caprificated several thousand Smyrna fig trees in the Roeding orchard near Fresno. The result was that some 6 tons of dried figs of the true Smyrna varieties were produced. These figs were all of very good quality and possessed the characteristics of the Smyrna figs. This year I am informed that some 30,000 caprifigs have been used for caprification on the same place, and a much larger crop may be expected. The time for caprification in the central part of the San Joaquin Valley is in the middle of June, while at Niles, near San Francisco Bay, the time for caprification is in July. There exist

¹ So called because they were distributed to the subscribers of the *San Francisco Bulletin*, an evening daily paper, which, during Mr. G. P. Rixford's management, did much for horticulture in California.

now in California some five or six different varieties of the genuine Smyrna figs and some nineteen different kinds of caprifigs. During the last season many thousand genuine Smyrna figs have been planted all over the State, and we may expect that in five or six years from now the harvest of figs of the Smyrna varieties will be considerably increased. In the meantime improvements are constantly being made in handling and curing the common figs for market.

The *Blastophaga* wasps are now apparently well established in this country. They wintered safely in the mamme figs both at Niles and at Fresno. At Niles the temperature fell as low as 22° Fahrenheit, but no harm was done to the fig insects. At Niles only one variety carried its mamme over winter. The other varieties of caprifigs dropped their mamme figs after the first fall frost. This may have been due to the immature age or the nature of the trees. It shows, however, the necessity of planting a number of different kinds of caprifigs in order to have a succession of crops and a constant supply of caprifigs both winter and summer.

SEEDS IN THE COMMON EDIBLE, NOT CAPRIFICATED FIGS.

As common figs I arrange, as has already been stated, all fig varieties with only or principally mule flowers, which set and mature their figs without the aid of pollen. If the seeds of such figs are examined under the microscope it will at once be seen that they are seeds only in appearance, but not in reality. They are mere glossy hulls of a yellow or brown color, with no kernel and embryo capable of development. Even without the aid of a microscope this may be ascertained by crushing the seeds with the point of a knife. The shell will then be seen to collapse, the interior being absolutely without any kernel. Although I have examined many thousands of figs grown in California during the past ten years or more, I have failed to find a single seed properly developed. I at first attributed this to the former total absence of caprifigs in this State. I now believe it to be due in equal degree to the absence, or scarcity, of female receptive flowers in our figs, generally speaking. This observation in regard to the absence of seeds in common figs has been repeatedly made in Europe.

The conclusion which I draw from the above and other investigations in regard to the perfect and fertile seeds found in our common edible figs, which produce fruit without pollination, are as follows: Figs with only mule flowers do not generally produce seed with fertile embryos. Their so-called seeds are mere shells without kernel. When this class of figs is found to contain seeds with developed embryo, it is to be explained by the presence of perfect female flowers, which again have been brought to development by the introduction of pollen, either by the *Blastophaga* wasps or by some other means. Some fig varieties of this class contain many female flowers.

Parthenogenesis, or seed development without pollen, has been supposed to exist in at least one tropical fig (*Ficus roxburghii*); here, however, only by excitement caused by the sting of a Blastophaga, without pollination. That this is not the process of seed production in the Smyrna tribe of our edible fig is absolutely and conclusively proven by the experiments of Mr. E. W. Maslin and myself. We produced seedlings from Smyrna fig seeds which all, when arriving at bearing age, proved to be hybrids between the edible Smyrna and the wild caprifig. This hybridization could of course not possibly have taken place except by the introduction of pollen to the female flowers. If their seeds had developed by parthenogenesis the seedlings would not have been hybrids, but would have been varieties of the Smyrna fig. The seeds were taken from imported Smyrna figs, which had been capriflicated in Aidin.

DIFFERENT TYPES OF EDIBLE FIGS.

We can distinguish a number of distinct classes or types of figs which differ from one another in several very important points. Of these types there are at least six which are well characterized.

Common figs, Mission figs, or first type.—The common edible figs, which produce both ripe brebas (first crop) and second-crop figs (receptacles) without capriflication or pollination. This type becomes pomologically mature, but rarely botanically mature. Its flowers are mainly mule flowers and a few female flowers, but no perfect gall flowers and no male flowers. This class includes nearly all of our common edible figs in Europe and California and all those propagated in hothouses. This class of figs bears several crops, but there is no great or important difference either in the receptacle or in the flowers of the respective crops. Some, or possibly all, of the fig varieties belonging to this type produce some fertile seeds when pollinated or capriflicated. For this type I propose the name Mission figs as a suitable name, because the principal and best-known representative of this class is known in this country as the Mission fig.

Smyrna figs, or second type.—This type or group comprises the Smyrna figs and is characterized by its flowers, which are female only, perfectly developed. They produce fruit only when pollinated or capriflicated. They have no mule flowers, no gall flowers, and no male flowers. The fruit becomes botanically ripe, and as a consequence of the botanical maturity the receptacle becomes also pomologically ripe. This is a purely female type, all the flowers being perfectly developed female flowers. This type of figs is at present confined chiefly to the Smyrna district, being there the only fig cultivated for commercial purposes. In the other Mediterranean districts this type of figs is rare or unknown. Introduced to California, it never produced fruit until pollinated.

San Pedro figs, or third type.—This is the San Pedro type, with

different flowers in the different crops. The first crop or "flori" contains only mule flowers. This crop becomes consequently pomologically ripe without pollination or caprification, and it is questionable if it will ever become botanically ripe or produce seeds, even if caprificated.

The second crop contains only fully developed female flowers which require pollination in order to set fruit or become botanically mature, the receptacle never becoming pomologically mature as long as the flowers are not pollinated.

To this class belongs a limited number of figs, which are especially valuable on account of their "brebas" or first crop. Among varieties belonging to this crop are the San Pedro (yellow), the Gentile, the Bitontoni, the Portuguese, and a few others.

Adriatic figs, or fourth type.—This type contains figs which do not mature brebas, or first crop, without caprification or pollination. Except under the latter condition this first crop always drops. When pollinated or caprificated again the crop sets and matures. The certainty of this fact is due to experiments made lately by Mr. John C. Jones, who caprificated at Niles an Adriatic fig tree in April last. This tree is the only one out of many which has set a crop of brebas, all others having dropped theirs. On cutting open these caprificated brebas we find that they contain perfectly developed seeds. The second crop of this type of figs does not require caprification in order to reach pomological maturity. To this class belong a very large number of figs which have until now been cultivated only for their second crop. The second crop contains many female flowers.

Cordelia figs, or fifth type.—To this type belong all figs which, like the Cordelia, Croisic, and others, possess edible figs with male flowers.

Erinocyce figs, or sixth type.—To this type belongs the Erinocyce fig previously described. It possesses male flowers and gall flowers in the first crop and female flowers and gall flowers in the second crop. The first crop is not edible. To what extent the Erinocyce and the Cordelia type combine is not known.

Origin of the types.—The origin of these various types I derive from the various crops of the caprifig, through artificial or horticultural selection. The first type may have descended from the male tree of the caprifig, through elimination of the male flowers. The gall flowers in not being used for galls would naturally endeavor to regain their female nature, while the female flowers, by now and then being pollinated, would more or less retain their female or seed-producing nature. This theory was first suggested by me in a letter to Professor Solms-Laubach, who, however, thinks that the origin of this class may be equally well explained by supposing their descent from the female caprifig, in which case the female flowers, through nonuse, have become degenerated. But the fact that this class contains both mule flowers and perfect female flowers speaks, I think, in

favor of my theory that the mule flowers are in reality only degenerated gall flowers, or perhaps more correctly gall flowers which through nonuse are regaining their female nature. If descended from the female tree of the caprifig there is nothing to explain why some of the flowers are capable of producing seed while others are not.

The second type, or Smyrna figs, must have descended directly from the female tree of the caprifig, their flowers having retained their female nature through constant caprification.

The third and fourth classes are more difficult to explain. They have probably descended from a cross between a female Smyrna and a caprifig.

The fifth class is nothing else than a direct descendant from the male caprifig. It retains its male flowers, they having not yet been eliminated, while the pomological maturity is simply an improved botanical maturity of the caprifig, as it is well known that several varieties of caprifigs are edible, though inferior in quality.

How this cultural evolution and development could have taken place is not difficult to understand. The efforts of man to cultivate and propagate only the best or what proves most suited to his purposes have caused him to gradually discard, first all inferior trees, later all inferior varieties, all which either did not suit his taste or which in other respects did not prove as profitable as others. This progress in selecting varieties has been continued to our own day with nearly all kinds of fruit, progressing more or less rapidly, according to the intelligence and civilization of the cultivators. As the fig is one of the oldest of fruits mentioned in the history of the human race, the selection and improvement of varieties must have taken place at an early date; in fact, at the dawn of higher civilization. No barbarous people could evolve the luscious edible fig from the insignificant and worthless caprifig, even if we suppose that some chance seedling of the female type with superior fruits had been found. The likelihood that caprification was invented simultaneously with the cultivation of the first edible fig makes it more probable that the civilization of the people in question was considerable. The origin of the edible fig of the Smyrna kind must be traced to some one of those ancient nations of the valleys of the Euphrates and Tigris whose history and remains archæologists are now beginning to unravel.

It is possible that the Smyrna race of figs was first originated and that later the other class of edible figs was evolved. Or it may be that both originated simultaneously, or nearly so, in separate countries. The truth and facts of this we will probably never know, and our assertions can only have the value of more or less probable conjectures.

The first figs of either class must have been very inferior to those now considered our best. The class which descended from seeds of the male caprifig must, to begin with, have possessed some male flowers

in at least one of its crops. The first effort in selection must have been to eliminate these male flowers, as both they and the part of the receptacle on which they grow are hard, dry, and otherwise not palatable. Thus in the Croisie fig the male flowers, together with their part of the receptacle, is always removed before eating, and this necessary process must have first stimulated effort to produce a fig without the objectionable parts. While this selection and improvement of edible figs was being carried on by the ancient cultivators the wild fig was not entirely left to itself. It was found necessary in some instances to propagate even the wild fig in order to procure the figs for caprification. What would be more natural than to suppose that those figs were especially propagated which produced greater abundance of pollen and a more perfect continuation of crops? This selection in a small way would in time give rise to several types, even among the wild figs, similar to those, perhaps, described by Pontedera, Gallesio, and others.

After the first objectionable features of male flowers were eliminated other improvements followed as to flavor, taste, sweetness, etc.

FIG INSECTS.

FIG WASPS OR BLASTOPHAGAS.

All known wild fig trees, and there are over 100 distinct species described¹ by botanists, are inhabited by very minute wasps known

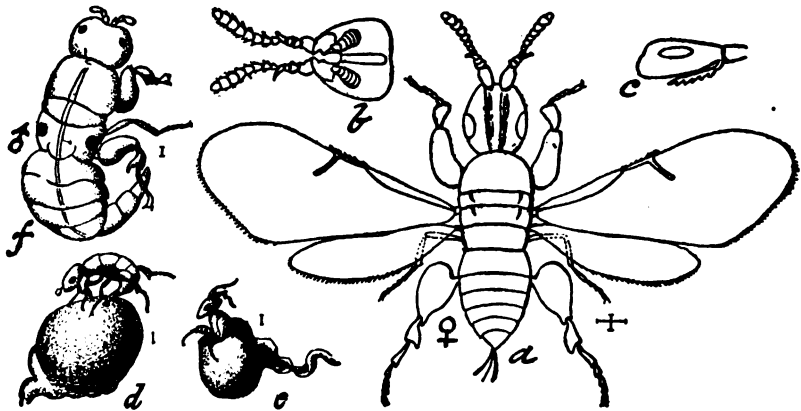


FIG. 16.—*Blastophaga grossorum*: a, adult female; b, head of same from below; c, head of same from side; d, male impregnating female; e, female issuing from gall; f, adult male—enlarged (after Westwood). (From Smyrna Fig Culture in the United States, by Dr. L. O. Howard.)

as “inquilines” or parasites, and scientifically described as *Blastophagæ*. (See fig. 16.) These *Blastophagas* not only visit the figs, but they live, breed, and develop in them; nay more, if deprived of their fig hosts, these *Blastophagas* could not live, breed, and develop anywhere else. The organization of these little wasps is such that while

¹ According to Willkomm, there are 500 species of figs described.

they may possibly feed themselves for a short time (though it is doubtful if they do feed at all), they could not possibly deposit their eggs elsewhere than in the "gall flower" of their respective fig, not even in the female flowers of the same fig. Even if they did succeed in doing so, their eggs would not develop elsewhere and the brood would soon perish. The species would thus become extinct. But this is not all. The relation between the fig and the *Blastophagas* is so intimate that in order to foster these little wasps nature provides the fig with flowers especially constructed to their use—the "gall flowers" elsewhere described. But if the *Blastophaga* is dependent upon the fig for its existence, the fig is hardly the less so upon the *Blastophaga*. Without the *Blastophaga* no fertile seed would be produced with any regularity (if at all) and the fig species would be in danger of perishing. The influence of the *Blastophaga* is somewhat different in different fig species. It has been shown that in one species at least not only the female flowers are dependent for their pollination upon the *Blastophagas*, but that the male flowers actually do not develop their fertilizing pollen without having first been stimulated by the mechanical action of the *Blastophaga*.

Figs are visited by many insects, but a distinction must be made between "visitors" or "messmates" and "regular boarders." The former visit the figs in order to feed, either on the fruit and its juices or upon other insects. The boarders or "inquilines" again breed in the fig and can not breed anywhere else. The former will injure the fig in various degrees, while the latter are absolutely necessary for the material maintenance and multiplication of the fig-tree species they inhabit.

LIFE HISTORY OF THE CAPRIFIG WASP (*BLASTOPHAGA GROSSORUM*).

If we during the month of June or July¹ cut open a "profico" or first-crop caprifig just when it is full grown we may notice that it contains a large number of gall flowers or galls, around which crawl numerous little insects, some of which resemble minute black wasps, while others of the same size are wingless and very differently shaped, as well as being of a yellow or brown color. A closer inspection will reveal to us that a number of the galls are perforated by a single round hole through which may either be seen the hollow of the gall, or the wasp itself, not having yet escaped. A closer inspection may even show us how the light-colored insects, which are the male wasps, are enlarging the holes in order to enable the females or winged wasps

¹ The time differs according to the climatic conditions of the locality. In Italy caprification is practiced in June. At Niles, Cal., the caprifigs mature in the middle of July. In Lower California, I found the *Blastophagas* emerging from the figs of *Ficus palmeri* in March, from what must have been the first crop of that fig. A later generation again emerged in September.

to escape. These respective insects are male and female of the same species known to naturalists variously as *Blastophaga psenes*, *Blastophaga grossorum*, or *Cynips psenes*. The number of female *Blastophagas* which may issue from a single profico is often very large. I have counted as many as two hundred from one fig, and it is known that some varieties of caprifig profichi may harbor as many as 700 wasps.

The male insects are the first to hatch and escape; with their powerful mandibles or jaws they easily cut through their galls and then set to work to liberate the females. Before the latter escape they are fecundated, while yet in the gall, by the males. Each gall contains only one wasp. The male wasps never leave the fig. They are so constructed that they could not very well live outside, and even inside the fig they soon perish, their life work having been accomplished in liberating and fecundating the females. The females do not tarry long in the fig, but soon find their way out through the eye of the fig, which has opened sufficiently to let them pass through without injury to their wings.¹ In case the fig has been injured and compressed in such a way as to close the eye the wasps will remain prisoners until otherwise let out—for instance, by cutting the fig.

With care and aided by a magnifying glass, we may further follow the female *Blastophagas* as they escape from their old habitation. Their first work is to look for figs suitable to lay their eggs in, the only object of the wasps now being to propagate their species, it being doubtful if they feed at all. As soon as outside of the old caprifig the female *Blastophaga* halts on the outside of the fig and endeavors to free herself of a whitish powder with which she appears to be literally covered. This powder is the pollen from the anthers of the male flowers of the caprifig in which she hatched and with which she came in contact when she escaped from the fig. This process of cleaning she performs in very much the same way as does a house fly, stroking herself with her front legs, bending at the same time the head, body, and wings. She never succeeds in getting entirely clean, as a large portion of the pollen will adhere in spite of all her efforts. But when she considers herself sufficiently clean she flies away and lights on a less than half-grown caprifig of the same or some other tree. The mammoni or second crop of the caprifig has by this time advanced so far in development that its interior flowers are just of the proper size and age to suit the wasps.² If there are no such figs at hand the wasps will soon perish. Having lit on a mammoni, the

¹ In the Ba'a California species of *Blastophaga* which inhabits *Ficus palmeri* the wasps do not crawl through the eye of the fig, but cut a round hole below the eye and thus escape in the same way as they did from their galls, except that the hole made in the fig is larger than the hole in the gall.

² As has been shown elsewhere, this is not always the case. If there are no caprifigs of proper size the wasp can not lay her eggs.

Blastophaga finds the fig eye closed by scales.¹ But these scales are not impossible to penetrate. In order to enter the fig the *Blastophaga* saws out a tiny little piece of the outside edge of a top scale, which opens to her an entrance between two scales. Next she pushes herself under the scale and then zigzags herself through, until she reaches the interior hollow of the fig. But her efforts to get through between the scales have been tremendous, and in so doing she almost invariably loses her wings. They are always lost in the very beginning of her work and can be seen remaining, wedged in between the outside scales just like feathers stuck under the band of a hat. In order to ascertain the presence of the *Blastophaga* in a green fig it is not always necessary to cut the fig open, as the presence of the wings of the wasp sticking between the scales is a sure sign that the wasp has succeeded in getting in. And even if the wings have fallen off, the little wound caused by the gnawing of the wasp can be told by the minute drop of sap that has oozed out and hardened. It is this drop of sap which was, remarkably enough, for ages considered as being the real cause of the setting of the figs. If no wings and no gum are seen on the scale it may be safely assumed that no *Blastophaga* has entered the fig in question.

As soon as the now wingless *Blastophaga* has entered the fig she hurries down to the gall flowers, there to deposit her eggs. Of these she inserts only one in each flower. The egg is generally placed in the same way and in the same particular spot in the flower. This particular place lies between the nucellus of the fig ovary and the integument surrounding it. Observation shows that if left anywhere else the egg will not develop. In order to accomplish this the wasp first alights on the stigma of the gall flower. Then she extends her ovipositor and runs it down through the canal which, from the center of the stigma, leads through the whole length of the style to the funnel or entrance to the ovary of the flower. This is penetrated by the ovipositor, and the egg is laid and securely wedged in between the nucellus of the ovary and the integument surrounding it. (See fig. 17.)

As soon as the egg is deposited the ovipositor of the wasp is withdrawn. The lower part of the canal is filled by a filiform appendage of the egg, while the upper part fills with a brown exudation from the wounded cells. As soon as one egg has been laid the wasp departs to another flower, there to repeat the process. The egg-depositing power of a wasp is simply enormous, and one wasp is capable of laying an egg in each of the many gall flowers of a fig. After the eggs have all been deposited the *Blastophaga* endeavors to regain the outside of the fig in the same way she entered; but in this she rarely succeeds. Being by the egg-laying process completely exhausted, she

¹The closing of the eye by scales is a necessity. If the eye was open the *Blastophaga* would find the fig full of other insects, and the function in the fig flowers would be seriously, if not fatally, interfered with.



CAPRIFICATED MAMMONI AND MAMME MILCO CAPRIFIG, JUNE, 1901.

generally succumbs before she regains her liberty, and her dead body may be found in the opened fig. The work of the Blastophaga has not alone been that of depositing eggs. Involuntarily she has rubbed against some of the female flowers of the fig, and the pollen which adhered to her body when she entered has been deposited on the stigmas of these flowers. The effect of this pollination is the development of seeds in the female flowers. This would not have taken place without the aid of the wasp, because the pollen from another fig could not very well have penetrated through the closely thatched scales of the eye; and the pollen from a male flower in the same fig would only be ripe from a month to six weeks after the time when the stigmas of the female flowers will have attained their full development and receptivity. After the egg has been deposited the gall flower does not at once cease to develop. The embryo and kernel of the seed keep on growing for a month. After that the egg of the Blastophaga begins to develop, and when it passes into the larva stage it begins to feed on the embryo of the fig, which thus soon perishes. The integument of the ovary again grows and assumes the form of a large, hard, brownish, and glass-like gall. In two months the young female Blastophaga wasps have attained their full development, and after copulation with the wingless males are ready to leave the caprifigs; and this they do in the same way as they left the previous crop, the profichi. The males die within the figs in all the crops. They have performed their function and are of no more use. It may here be incidentally stated that even if the wasp's egg is not deposited in a gall flower, the latter will after a certain time cease to develop. It will never produce seed.

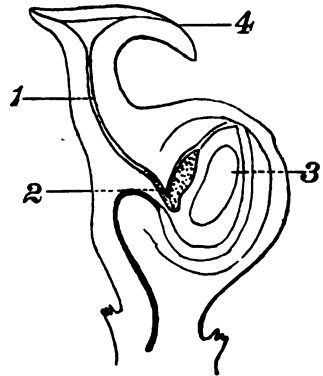


FIG. 17.—Gall flower of caprifig, after Solms-Laubach: 1, canal from stigma to ovary through which the ovipositor of the Blastophaga pushes the egg; 2, egg of Blastophaga; 3, nucellus of the fig ovary; 4, stigma modified for the use of the Blastophaga.

At this time the winter figs or the "mamme" destined to mature the following year are of the proper size and development required by the Blastophagas, which enter them in the same way as described above in order to deposit eggs. The mamme hibernate, and next spring, in March, develop and ripen and the young Blastophagas leave as before. (Pl. XIII.) They immediately afterwards enter the first-crop caprifigs and their deposited eggs will by the end of June or July have developed into perfect wasps.

The cycle of the Blastophaga is thus perfected and we have followed its life history through the various crops of the caprifig through the

year. Each crop of figs has, as we have seen, had its own crop or brood of wasps, from which it follows that if the profichi or mamme should fail the wasps would also perish.

To facilitate the understanding of the life history of the wasp, as observed in Italy, the following diagrammatic table has been prepared.

A. Profichi of the caprifig, October to June:

1. In March or April these figs are less than quarter grown.
2. The *Blastophaga* females, issuing from the mamme, enter the figs and here deposit their eggs in the gall flowers.
3. In June, or two months later, these *Blastophaga* eggs have become fully developed, and the perfect wasps emerge to seek other figs.
4. In emerging the wasps are covered with pollen.

B. Mammoni of the caprifig, June to autumn:

1. In June and July the second crop is quarter grown.
2. The *Blastophagas* emerging from the previous crop penetrate into these second-crop figs and deposit their eggs in the gall flowers.
3. In doing so they also pollinate the female flowers.
4. In August or September the *Blastophaga* eggs are fully developed and the perfect wasps emerge, hunting for the young figs of the mamme.
5. A few seeds fully developed are found in this the second crop of the caprifig, none being found in the other two crops.

C. Mamme of the caprifig, July, through winter, to March.

1. In autumn the mamme are quarter grown.
2. The *Blastophaga*, hatching from the preceding crop, enter the mamme and there deposit their eggs in the gall flowers.
3. The mamme, with the gall flowers and the eggs of the *Blastophaga*, hibernate on the tree, slowly increasing in size.
4. With the advent of spring the mamme and the *Blastophaga* eggs develop more rapidly.
5. In March and April the *Blastophaga* eggs have developed into full-grown wasps, which emerge from the figs seeking the young figs of the first crop, the profichi, in order to deposit their eggs in them.

PRACTICAL CAPRIFICATION.

Process of caprification.—The process of caprification consists in bringing the caprifigs, of the proper age and crop, in close proximity to the edible figs, in order that the wasps, as soon as they leave the caprifigs, may be lured into the edible figs. Practically, this is accomplished in different ways, more or less proper and economical. In Smyrna, Syria, Greece, Italy, and Africa the caprifigs are pulled at the proper time in June, the profichi being the only crop used for this purpose. The caprifigs are then becoming soft and the male flowers ready to shed their pollen. The caprifigs are at once strung on split reeds or rough straws in quantities of four on each straw. (Fig. 18.) These straws are thrown over and suspended among the branches of the edible-fig tree. Another method, much inferior to

the former, consists simply in cutting branches from the caprifig trees and suspending them in the edible-fig trees. This injures the caprifig trees and does not enable the cultivator to regulate the number of caprifigs according to the quantity actually needed. This method is in use only in certain parts of Portugal and Spain. A third way to accomplish caprification is to plant a few caprifig trees among the edible-fig trees, and to simply depend upon the wasps themselves finding their way in sufficient number to the edible figs. This method is the least proper of any for many reasons, one of which is that the caprifig thrives equally well or even better in poor, rocky, soil, and it would be more economical to give the good soil over to the edible-fig trees. This leads us to the necessity of having separate plantations for the caprifig.

Separate plantations of caprifigs.—In most countries where caprification is practiced it is a general saying that it is necessary to go to the hills for the caprifigs.¹ It is not only more economical, as has just been pointed out, to grow the caprifigs separately, but it is in many instances necessary. The soil and moisture in the orchard are not always suitable to the caprifig. It must be remembered that the caprifig is yet in its comparatively wild state, while the edible fig is a horticultural product or creation which can only be expected to attain its proper qualities under the most favorable conditions. Practically this is true. It frequently happens that when the edible figs are receptive, or their female flowers ready for pollination through caprification, the caprifigs growing in the vicinity of the edible figs are not properly developed, while other caprifigs grown in different soil and at a different elevation are just of the proper size and condition to furnish both *Blastophagas* and pollen. But an even more serious objection to having a few caprifigs growing in rich soil is that their crops are not always following each other in continuous succession. The *Blastophaga*, in order to properly propagate her brood, requires young caprifigs ready to receive her eggs as soon as she hatches out. Frequently the tree from which she hatches does not possess these figs, while other caprifig trees do. It is therefore necessary, in order to procure a constant supply of *Blastophagas*, to have a large number of different varieties of caprifig trees growing together. In a grove of such trees there will always be some that bear figs of proper size in which the wasps may breed. Such plantations of caprifigs should be made separately and in various localities, in order that the supply of figs may never fail. Quite frequently it also happens that the caprifig crop in a certain locality fails, while in a different one, where the climatic conditions have been dissimilar, the crop of caprifigs may be abundant. This shows the neces-

¹ Prof. Newton B. Pierce, of the Department of Agriculture, in Washington, who has observed caprification in Sicily, informs me that in the vicinity of Palermo the caprifigs are always brought from the "hills."

sity of having caprifig plantations in various localities, especially in a country like California, where the caprifig trees are not wild and where frequent importations of caprifigs with inquilines are difficult if not impossible. When the caprifig crop fails in Smyrna fresh caprifigs are imported by the vessel load from the Grecian islands, and in all countries where caprifigation is considered necessary in order to procure a crop of figs a regular and profitable trade is carried on in caprifigs, which often bring much more than the edible figs.¹ Caprifigs should on no account be pruned, but allowed to grow wild. The wasps require shade, and the best caprifigs are always found in the densest shade. All suckers and small twigs on the main trunks of the caprifig tree should be allowed to remain.

Quantities of caprifigs required.—The quantity of caprifigs needed to caprifigate a fig tree varies with the size of the tree. The number depends also on the quality of the caprifig and the number of its wasps. In California from 20 to 50 profichi seem to suffice. If too



FIG. 18.—Caprifigs strung on reed used for caprifigation. The figs are dried and the wasps have escaped.

few are hung on the tree an insufficient quantity of wasps is had and the edible figs are not all pollinated. If too many are hung too many wasps will enter the edible figs, injure their flowers, and, according to some observers, cause the figs to prematurely drop and decay.

For smaller trees a less quantity of caprifigs is required than for larger trees, but even the largest in Smyrna are not given more than 30 strings to the tree. The caprifigs are hung on the limbs of the fig trees before sunrise and when the wind is not blowing. The process of hanging up the profichi must be repeated several times, as only those edible figs are pollinated which are of proper size and receptivity. For the younger figs new profichi must be supplied later on, if their maturity is required, and the quantity of caprifigs necessary at any time must be regulated according to the number of figs to be pollinated.

¹ Solms-Laubach, p. 60, relates how a "Rottolo" of profichi in Ischia frequently brings half a lira. According to Leclerc, p. 16, c. p. 330, and Hanoteau et Letourneaux, pp. 433, etc., the caprifigs sell in Fort Napoleon for 2 sous per dozen.

Proper time for caprification.—Caprification should always take place when the female flowers of the fig are receptive. This can be easily ascertained by cutting open the fig. With a magnifying glass the stigmas of the female flowers should be seen to be bright and light greenish, with a peculiar fresh luster, as if they had been lightly varnished or moistened. Further, the stigmas and styles should be erect; if bent and brownish they are too old to receive the pollen and past their receptive state. This occurs in Smyrna and in the Mediterranean districts in the middle of June. The second crop, the only one used, is then in proper state of development to be caprificated. In California the time for caprification will vary with the locality. In the Bay district, around San Francisco, the Smyrna figs are receptive by the end of July; in the interior earlier, in June. The edible figs when ready for the caprifigs are about one-third grown, hard, and green. The caprifig, again, should be cut when the pollen is properly developed and just before it has burst from the anthers. The caprifigs are then becoming soft, though on opening them it will be found that the Blastophagas have not yet begun to hatch. The size of the fig varies with variety—as there are many varieties in caprifigs—but the average size would be an inch and a half long by three-quarters of an inch wide. Some caprifigs are much smaller. Thus the caprifigs received from Smyrna and taken there from the fig trees in which they had been suspended, were almost twice as large as those brought from Palermo.¹ The profichi and mamme are larger than the mammoni.

The various races of caprifig vary in size and softness, some remaining always hard, while others grow larger and become soft and pulpy.

As regards the Smyrna figs at the time of caprification, it may be stated that at the moment when their female flowers are receptive the scales at the eye loosen, or rather become flexible, allowing the wasps to enter. This softness of the scales may be easily ascertained, as by pushing a quill or a stick against the fig eye. It easily penetrates between the scales, without injury to them and without causing any juice to exude, if the fig is of proper size, while, on the contrary, if the fig is too young the scales will be found to be hard and fixed, can not be pushed back, and the least wounding will cause an abundance of milky juice to exude. If again the fig is too old, the scales will be equally hard and fixed and the fig will be yellow and will drop readily.

If the fig is cut open, the stigmas should be fresh and moist, the styles erect and greenish, not brown.

What takes place in caprification.—We have already followed the life history of the Blastophaga in the caprifig. Its history in the edible fig is somewhat different. The wasps can not live in the edible figs; they can only visit them. Shortly after the profichi have been

¹ By Prof. N. B. Pierce.

suspended, or sometimes even before, the *Blastophagas* begin to hatch. It even appears that the pulling of the caprifigs hastens the maturity and escape of the wasp. As soon as these have hatched they crawl out of the caprifigs in search of young caprifig mammoni, in them to lay their eggs, as has already been described. But as the caprifigs are not near, no such mammoni are to be found. In place of them the wasps encounter only edible figs, and not being aware of the deception practiced, they enter these edible figs for the purpose of breeding. The flowers of the edible figs are, however, so constructed that the intentions of the wasps are completely frustrated. Instead of the necessary gall flowers, which are especially adapted to the ovipositor organs of the wasps, only female flowers with long styles are found and which are otherwise so modified that the wasps find it impossible to properly lay their eggs. All their frantic efforts to penetrate the canal of the style and to reach the fig ovary and its nucellus are in vain. The *Blastophaga* can not breed in any edible fig. Still, her visit has a very great effect on the edible female fig flowers, provided these are of the proper age and development. The pollen from the caprifig, with which the wasps were liberally dusted, adheres to the female stigmas, the effect being pollination and fecundation of the flowers. The *Blastophaga* herself dies and her dead body may be seen upon opening a fig which has not advanced too far in maturity.

It is here assumed, as is really the case, that the wasp can not properly place its egg in the female flower, but even if she could do so or would accidentally do so, the egg would not properly develop, as it is only the gall flower which is suitable to the growth of the larva of the wasp. But even if by chance such development would take place the young wasp would quickly perish by being enveloped in the sugary liquid of the mature fig. A certainty is, however, that I have never found any gall in the mature *Smyrna* figs, which shows that no such development takes place.

What does not take place in caprification.—Since the most remote time so many opinions have been expressed as regards the consequences of caprification that it may be proper to here point out what does not take place. The old opinion that the gnawing of the wasp relieves the fig of its superfluous juices and thus causes it to mature is too absurd to be given much thought. The gnawing done by the wasps is so infinitely small that the fig, through the combined efforts of 20 wasps, would not lose one ordinary drop of sap. Figs wounded by a needle in such a way that many drops of juice escape do not show any tendency to set better, as I have repeatedly demonstrated. The gnawing of a few wasps can, therefore, not have any effect on the receptacle of the fig. The pollination alone can account for the maturing of such figs as require caprification. Thus, of all the figs which we have tried in California, some fifty or more varieties, only some seven or eight kinds do not set their fruit; all others do. To

caprificate the regular and common kind of edible figs would, therefore, be a useless waste of time and work. They would probably produce some fertile seeds, but it is doubtful if their quantity would be sufficient to greatly improve the fig. It has been said that the *Blasphaga* produces a gall in the edible figs, and that this gall formation would cause the figs to set and mature, in the same way as a worm-eaten pear or apple ripens sooner than the uninjured fruit. But we have already seen that no such gall is produced in edible figs, and experiments in Italy have almost conclusively demonstrated that the entrance of the wasps does not hasten the maturity of the common fig.

We may, therefore, with a fair degree of certainty, establish the following facts:

1. The visit of the wasps to the female flowers of the Smyrna figs is powerless to produce fertility or maturity, except when accompanied by pollination.

2. The gnawing of the wasps on the scales of the eye, or the mere irritation of the flowers, does not produce a flow of sap sufficient to stimulate the fig to set and mature.

THE EFFECTS OF CAPRIFICATION.

Caprification can, therefore, only be effective and profitable in varieties which contain a majority of developed female flowers. If such figs are not caprificated, they will drop off shortly after the receptivity of the female flowers is past. On such figs the immediate effect of caprification is, first, the setting and the coming to full maturity of the fig receptacle (the fig); second, the development and maturity of the female flowers and their ovaries and seeds. Another important effect of caprification is the dropping at full maturity of caprificated figs, or rather of figs in which caprification has been successful. All Smyrna figs drop of themselves when ripe, while all other fig varieties in which caprification is not an absolute necessity, must be cut or pulled from the tree at harvest time, as they will fall only when past their prime. The advantage of having figs requiring caprification is, therefore, evident in all districts where such figs will grow.

The expense of caprification is much smaller and requires less labor than the pulling or cutting off of the figs when ripe; provided, of course, that the figs would set without being caprificated, which they will not do.

Besides the pomological or horticultural maturity of the receptacle the caprification produces the botanical maturity of the female flowers, which, as we will see, is of great importance as determining the quality of the fig.

THE IMPORTANCE OF SEEDS IN DRIED FIGS.

The greater value of caprificated varieties over those which do not require the process is to be sought in the development of fertile seed.

The seeds in our common figs consist only of empty, glossy shells, with no trace of kernel. All such seeds have no taste and can in no way contribute to the flavor of the dried fig. Not so, however, with Smyrna figs which have been caprificated. They all contain seed of large size, with a full, oily kernel, which, when crushed, is found to be in the highest degree aromatic and "nutty." Such seed, when present in sufficient quantity, greatly contribute to the quality of the figs, giving them an intensely aromatic flavor. It is only during the process of drying that the aromatic taste of the seed is permeated through the pulp of the fig, in very much the same manner as almonds and other nuts communicate their flavors to puddings, preserves, or canned fruits generally. Smyrna figs when dried are therefore more highly flavored than any other figs. To the fresh fig the seeds do not communicate this aroma, and fresh caprificated figs are therefore not superior to other fresh figs; at least the caprification does not produce the superiority, if there is one.¹

WHICH FIGS SHOULD BE CAPRIFICATED?

The shortest answer to this question is, all figs which drop off if not caprificated. It has not yet been fully ascertained which these figs are. It is only certain that the great majority of figs will mature their receptacles without caprification. In California we have, however, for some ten years had growing several varieties imported from Smyrna, and of these none perfected fruit until they were artificially pollinated. This class, then, requires pollination and caprification, and must be caprificated if fruit is to be expected. We have also had other figs in California which have never matured fruit, though 20 years old.

Another class of figs requires caprification for the second crop. Among such varieties San Pedro is the most prominent one. But there are other varieties like the white San Pedro, the Portuguese of Italy, the Gentile, etc., all of which set their first crop, but drop their second crop. Microscopic examination shows that the second crop of these figs possesses fully developed female flowers, while the first crop which matures has only flowers with abortive ovaries. In another place in this paper I have related my experiments in caprificating the second crop of San Pedro and Gentile and the success achieved, undoubtedly proving that caprification is necessary for a certain crop while it is not necessary for another crop. Another class or type of figs which requires caprification for one of its crops is the one to which the Adriatic fig belongs. This class drops its first

¹I was the first one to call attention to the value of the fig seed as a source of aroma and flavor in dried figs. This is now almost everywhere accepted as true and as being one of the chief causes of the superiority of the Smyrna fig over non-caprificated figs. Leclerc was the first one to point out the superiority of caprificated figs, in Algiers, but he does not mention the cause (p. 332).

crop if it is not caprificated. The second crop is always set and matured without caprification.

WHERE CAPRIFICATION IS PRACTICED.

Nowhere is caprification practiced more thoroughly, more constantly, and more successfully than in the home of the fig—Syria and Asia Minor. In the vicinity of Smyrna, the foremost fig region of the world, the figs of which are acknowledged superior to any grown elsewhere, caprification is a necessity. The fig crop without it would fail—at least the crops from all varieties which produce the Smyrna figs of commerce. The fact that some figs may be produced without caprification even there, must be attributed to the same cause which produces some fertile seed in the Italian figs without direct fertilization by caprification. The real cause of the setting of figs in either case is the presence of caprifigs in the vicinity, from which the wasps carry the pollen irregularly and sparingly, but sufficiently to produce a few figs and a few seed. The importance of caprifigs in Syria and Smyrna is so great that they often command a higher price than the edible figs, and in cases of failure of the caprifig crop sailing vessels are sent to distant ports, to the Grecian islands, to bring whole cargoes of the fruit. This bringing of cargoes of caprifigs, at great expense, by intelligent growers, must point to the value of caprification there, and is in glaring contrast with the occasional practice of some ignorant cultivators in Greece and Italy, who, failing to procure caprifigs, suspended galls of elm trees among their figs. As the culture of figs followed the immigration of the Phœnicians, and later on that of the Arabs, so do we to this day find caprification practiced in all countries formerly occupied by those nations—that is along the north coast of Africa, in Algiers and Morocco, in the islands of the Mediterranean, Cyprus, Crete, Sicily, and the Malta group, and farther west, in the southern parts of Spain and Portugal.

To this day caprifigs are highly valued and bring a high price in Tripoli, Tunis, Algiers, and Morocco, and parts of the Iberian Peninsula, especially when the crop is scarce. Leclerc tells us that in Algiers the profichi of the caprifig bring 2 sous per dozen (not quite a half cent). They are regular merchandise in all these markets.

In Greece caprification has been in vogue since very ancient times, as has been mentioned elsewhere. From that country it spread to southern Italy first after the time of Pliny, and has there been practiced ever since, principally in the territory of the old kingdom of Naples or in southern Italy generally.

To the general rule that caprification is practiced in Greece and Grecian colonies, one exception is mentioned by Solms-Laubach. In Marseille (Provence) and vicinity caprification is not practiced. It is also not practiced in central and northern Italy, or in the territories occupied anciently by the old Umbrians, Etrurians, and Latins, nor is

it practiced anywhere in southern France and the Riviera. Solms-Laubach declares two causes for this to be possible. Either in ancient times caprification was practiced even there, and later on abandoned, or it was never introduced, fig culture having been only lately brought to these regions, and at a time when caprification was no longer necessary, varieties in the meantime having appeared which would ripen their receptacles without it. But as from the descriptions of Pliny and Cato it becomes evident that caprification was not known in Italy in their time, it is almost certain that in countries where caprification is not now practiced it has never been introduced. This is the case in all fig districts of America, as neither in the Southern States, in California, nor in Brazil, Argentina, Peru, or Chile, had caprification ever been even advocated until within the last ten years, or after the late introduction of the real Smyrna figs from Smyrna. This has also been the case in Australia and New Zealand. It is probable that to countries within easy reach of Syria the first varieties introduced were those requiring caprification; later only the self-ripening kinds followed, or were originated on the spot. The kinds which require caprification are much more exacting of climate, soils, and conditions generally than the self-ripening kinds, as we know that Smyrna figs, if transplanted to less favored localities, lose their superior qualities, even if caprifigged. As the self-ripening kinds became more common and more widely distributed the Smyrna varieties were allowed to gradually die out, but the caprification had taken such hold and had become so deeply rooted that it continued to be practiced on varieties which did not require it.

The circumstance, again, that caprification was not introduced into the more northern provinces, such as north Italy, south France, and north of Spain, must be sought in the unsuitability of those places for those varieties which required caprification. It is more than probable that in the above countries fig culture never assumed any degree of development until the advent of figs which did not require caprification in order to bear. The variety of caprifig which carries its mamme over winter is more susceptible to frost than other figs. At least it is impossible for the fig wasps to survive in countries where the caprifig crops are interrupted by heavy winter or spring frosts. This would also make caprification impossible, unless the caprifigs were yearly imported from more favored districts—a proceeding that would not prove practical or remunerative.

CAN OTHER INSECTS BE SUBSTITUTED FOR THE BLASTOPHAGA?

It is well known that figs are visited by numerous insects other than the regular Blastophaga, and the question arises to what degree could they be depended upon to carry the pollen from the caprifig to the edible fig, or could they do so at all. Some entomologists not acquainted with the practical side of the question have claimed that

the *Blastophaga* was not required, but that any insect would do the work. In order to carry the pollen from one fig to another it is by no means necessary that the insect should breed in the fig. All it has to do is to crawl into the caprifig at the proper time and then crawl out and into the edible fig, and the pollination is accomplished; but in order that any practical result to the crop at large may come from this visit, several circumstances are imperatively necessary, and must coincide. The insects must make these visits at the proper time; they must be of proper size to be able to enter the closed eye of the fig; they must be present in sufficiently large number to pollinate the fig crop, not single figs. As to the first point it will be seen that no other insect has been found which will have any business in the caprifig at the time when required; and even if the pollen of the caprifig would serve as its food, it would have no cause to afterwards visit the edible fig, which at the period when such visit is required does not produce any food, it being green and hard, with no trace of sugar. Insects only visit flowers in search of food or to lay their eggs. No other insect than the *Blastophaga* has been found to do the latter properly and at the time when required. The second point is readily understood. The eye of the edible fig is closed, and only an insect with a peculiarly developed instinct would know how to push its way between the closed scales. At this stage of the development of the fig no insects have been found which visit the figs, except the *Blastophaga* and some parasitical wasps which prey on her brood, and which would not enter the fig unless they knew the *Blastophagas* were already there. The most important point, however, is the quantity of insects required at a given time. Only an insect which will actually breed in the caprifig can be depended on, and it must breed in countless numbers. A few visitors would have no practical influence on the fig crops. They may fertilize or pollinate a few flowers, but they would be of no practical value to the grower and would not produce a crop. Taking it all in all no insect has been known, and no one is likely to ever be known, that can be substituted for the *Blastophaga grossorum*.

DIFFERENT SPECIES OF BLASTOPHAGA IN DIFFERENT SPECIES OF FIGS.

As far as is known, different species of figs are, as a rule, inhabited by distinct and characteristic species of inquilines. Thus *Blastophaga grossorum* has been found in only one or two nearly related fig species, and no other *Blastophaga* species has been found in our caprifigs. Parasitical wasps are always found together with the *Blastophagas*, preying on and developing in them just as the *Blastophaga* preys on and develops in the embryo of the fig. Even when different fig species grow close together do the wasps keep to their respective fig hosts; accidentally the wasps may visit other figs, but they do not breed in them. It appears almost certain that every fig

species is inhabited by *Blastophagas*. Thus, in the botanical garden of Java, a row of fig trees, consisting of five different species of figs, was found to be inhabited by as many different species of *Blastophaga*, each variety in its own fig host, to which it was strictly confined. The cause of this localization of species must be sought in the organization of the wasps and their ovipository organs, which enable the insect to deposit its eggs in a certain kind of flower only, which again has been changed so as to accommodate the peculiarities of the wasp, her size and capabilities. Under such circumstances there is no hope that, for instance, the wasp inhabiting the Baja California and Sonora fig species can be made to inhabit and breed in our caprifigs. Even the sycamore fig is inhabited by its species of *inquilines*, but which have never been found in the caprifigs. It may, therefore, be assumed with great certainty that only closely allied fig species are inhabited by the same species of *Blastophagas*. But in many species of figs we find more than one species of *Blastophaga*. Some figs are inhabited not only by different species, but also by different genera of true *Blastophaga*, while the latter again are preyed on by parasitical wasps often equal to them in size.

SUMMARY.

Caprification, then, is an horticultural process, based on scientific principles. It has been practiced since very ancient times, and is yet in vogue in many countries. It is an absolute necessity in places where Smyrna figs are grown, or in places where it is of importance to pollinate such figs as possess receptive female flowers. Caprification causes such figs to set and mature when otherwise they would fall off immature. This horticultural maturity is caused by and preceded by the botanical maturity of the female flowers. Again, caprification is not required for that great class of figs which sets and ripens fruit without it, unless, indeed, it should be found practical, profitable, and possible to produce seed in such varieties of this class as possess receptive female flowers in sufficient number. Caprification is necessary also for such caprifigs as do not produce overlapping crops.

HISTORICAL NOTES ON CAPRIFICATION.

There are very good reasons for supposing that caprification is as old as the cultivation of the fig by man. That it originated in some of the oldest agricultural countries is much more probable than that the practice is of comparatively modern origin—for instance, invented by the Greeks during the time intervening between the Homeric songs and the era of Alexander. For this belief speaks the fact that the caprifig is probably not a native of Greece nor of any other Mediterranean country, but of southern Arabia, and possibly also of other countries in the vicinity of the Red Sea and the Persian Gulf. The fig

was introduced into Greece, as has already been shown, and whether we presume that the first introduced fig race required caprification or not, it follows that this caprification was not and could not have been invented in Greece nor in any other country where the caprifig was not originally wild, and wild at the time the first figs requiring caprification were grown under cultivation. If the self-setting fig race had been the one first introduced into Greece, then the Greeks would never have thought of caprification, or if some uncommon genius had done so, he would have been obliged to go to distant countries in order to see, find, and bring home the caprifig, of which he could otherwise have had no possible knowledge. The discovery of caprification in Greece, as has been held by the majority of investigators except Solms-Laubach, would be as improbable and as impossible as the discovery of the placer mining of gold in a country where native gold occurs only in solid veins of ore.

Caprification must have originated in a country where the caprifig was wild. But particulars about the discovery are not forthcoming, the records having been forever lost. Even in the oldest books of the Semitic races no mention is made of any process which can with any certainty be explained as referring to caprification. As is stated elsewhere, in the Book of Amos we read of "*bôtês schiqmîm*," which means "one who operates on the wild fig." But if this operation refers to caprification, or to the oiling of the fig, or to the yet common and necessary practice of cutting the "sycamore figs" with a knife in order to give an opportunity to their inquilines to escape, will always remain an uncertainty, with some probability that the last explanation is the correct one. A circumstance which makes it probable that caprification was, in very ancient times, practiced in Asia is the fact that Syria is yet the country which grows principally or almost exclusively figs requiring caprification in order to set and mature. In nearly all other countries other, though inferior, varieties have been or are being substituted—varieties which mature without pollination and caprification.

For the oldest written record of caprification we must go to the oldest Greek writers. Aristotle, the teacher of Alexander, and the best-informed scholar of ancient times, describes caprification in very much the same way as it is practiced to this day. Aristotle explains the effects of caprification through the bite of the wasp, which causes the air to enter the fig, etc. He, as well as all writers for a period of two thousand years, or until the time of Linnæus, were unable to give a true explanation of the effects of caprification.

The most minute description of caprification as practiced and understood by the ancients is given by Theophrast. Not only does he correctly describe the process of caprification, but he informs us of certain facts of great interest. One of these is that there are two races of figs, one which requires caprification in order to set fruit, and

one which sets fruit without caprification. Theophrast was the first one to point this out, and he must have learned it through observation of the various fig varieties grown in his time. Another statement made by this writer is to the effect that caprificated figs had a lesser commercial value than figs not thus caprificated. Whatever may have been the case at this time, it is not so now. If Theophrast's statement is correct it can be explained by the fact of the Smyrna tribe not thriving in Greece or by their unimproved state at that time.

Theophrast also mentions how ignorant cultivators, instead of using caprifig, suspended other substances in the trees, such as galls from elm trees, the peasant believing that the wasps emerging from these elm galls would have the same effect as fig wasps. Of course, if the fig tree in which they were suspended belonged to a race which did require caprification, the effect of either variety of wasps (or of any other foreign substance) would be the same or none. Theophrast's explanation of the effects of caprification is similar to that given by Aristotle. He rejects the theory that the wasps close the eye of the fig and, through the prevention of the entrance of the air, cause maturity. On the contrary, he maintains that the wasps enlarge the eye of the fig, causing its juices to flow, suck up the superfluous "humors" of the fig, and that the warm and fermentation-producing air then effects the maturing of the figs. The differences between the two races of figs, of which one requires caprification and the other not, is explained by this author through the influence of soil and climate, as well as by a different nature of the fig, which enables it to ripen its fruit without the aid of the wasp. The circumstance that in Italy no caprification was practiced at his time he explains by the supposed drier soil and climate of that country, which absorbs the superfluous juices of the fig. The humid climate of Greece, he contends, makes it necessary to employ the aid of the wasps in order to relieve the figs of their superfluous moisture.

Pliny, the great Roman naturalist and compiler, follows Theophrast closely. He classes the caprifig as the wild fig, wanting in the juices necessary for the food of the wasps. The latter, not finding the necessary food, fly to the edible fig, and through nibbling enlarge the mouth of the fig and allow the fertilizing air to enter, which again transforms the milky juices of the fig to sweet honey. Pliny believed that caprification was practiced only in the Archipelago, from which it was later introduced into Italy. At the time of Pliny caprification was unknown in Italy. The account given by the great Latin naturalist is evidently only a compilation from other authors and from hearsay. He appears not to have made any personal investigations or examinations.

Through all the mediæval ages, or for over fifteen hundred years after Pliny, horticulture and natural science made little progress, and

the opinions of the ancient writers were adopted as regards almost all points of human knowledge. So also their theories about caprification. For fifteen hundred years after Pliny this process was practiced by the cultivators of the soil in the same way as in the time of ancient Greece; no one was found to inquire into its nature and value, much less to solve the enigma of this the most interesting of all horticultural usages of all times.

In 1583 Cæsalpinus discovered the sexual organs of plants and was able to point out their functions, but his discovery bore no fruit as regards a better understanding of caprification, and all writers after him for nearly two hundred years followed the teachings of Theophrast, Pliny, and Plutarch.

In the early part of the eighteenth century two botanists occupied themselves with a closer study of the fig. One of them was Giulio Pontedera, who was the first to describe the flowers of the caprifig and their structure, though he did not recognize their sexual nature. He also studied the fig wasps and caprification, but little suspected the true nature and influence of the wasp. Pontedera ascribes the effects of caprification to the biting of the wasps, which caused the air and light to enter the fig. This is the more remarkable when we consider how very minute are the wounds caused by even many wasps. As seldom more than very few wasps enter one fig, it will be seen that the extra air that can penetrate on account of the wasp bites is very small indeed, if any at all.

Another investigator, one of the most prominent botanists of the early part of the eighteenth century, was Tournefort. He traveled in the Levant and in Greece and made special study of caprification as practiced there. Being well acquainted with fig culture in Provence, in France, he was well qualified for his time to take up the study of caprification. Tournefort had studied Theophrast and tried to explain his statement about the lesser value of the caprified figs, through the necessity of drying such caprified figs in ovens, which caused their aroma to disappear. As Solms-Laubach points out, Tournefort confounded the wasps with moths which infest dried figs, just as is so frequently done in our day. Tournefort describes the three crops of caprifig and mentions the two races of edible figs, of which one requires caprification, while the other will set fruit without it. The effects of caprification he explains in the same way as everyone before him, by the biting of the wasps, which causes the superfluous juices to escape. Finally, he mentions that a fig which in Provence without caprification produces 25 pounds of figs, in the island of Zea gives 200 pounds—a very unsatisfactory statement when we consider the distance of the two localities and the uncertainty that the two trees were actually of the same variety, not to speak of climate, soil, age, cultivation, etc.

It was reserved for Linnæus to discover the true nature of caprification. While previous to his time the nature of the sexes in flowers

had been described and generally accepted, no one had thought of the possibility of an insect transmitting the pollen from one flower to another and thus causing fecundation. As Pliny of old had foreshadowed the theory of evolution, so did Linnæus a century before its rediscovery indicate how, at least in one instance, flowers were dependent on insects for their pollination. Linnæus points out how, in order that the female flowers of the fig may be properly fecundated, it becomes absolutely necessary for the pollen of the anthers to be distributed through the cavity of the fig. And this could not be accomplished if nature had not supplied the fig with a wasp which could carry the pollen from the male flowers to the female tree. And this wasp, he says, is the "psen" of the ancients, or the fig insect. The opinion of Linnæus was published in 1749. But Linnæus was not aware of the fact that some figs ripened their fruit without fecundation; want of material for investigation caused him to think that the fig was absolutely dioecious—in other words, that it possessed sexes distinctly separate, but on different trees.

John Hill, again, who published his great work, "A History of Plants," in London, 1751, refers only briefly to the fig and its caprification. He condemns Tournefort's theory of puncture and irritation, and states that pollination is the real effect of caprification; but he does not refer to Linnæus, though it is probable that he must have heard of the latter's views upon the subject.

Later in the century both Milne and Cavolini, independently of each other, discovered that a difference must be made between the maturing of the seed and the maturing of the receptacle, and that the former maturity, at least, must require pollination, even if the latter (or pomological maturity) could be accomplished without it. Milne clearly defines this by saying:

The question supposes that the fig trees in this country bring fruit to maturity without assistance of caprification, and the fact can not be denied. The same thing, we have seen, obtains in Spain, Provence, and Malta: but the fruit, or more properly, the fruit vessel, is in all cases to be distinguished from the seed contained within it. If the male be wanting, the seed will not vegetate when sown; but the fruit may, nevertheless, swell and come to an appearance of perfection; and so it is observed to do in the instance in question, and in many others, especially when the fruit is formed of one of the parts less connected with seed, as the calyx, receptacle, etc.

Filippo Cavolini published his work on caprification in 1782, or twelve years later than Milne, whose opinion he had, however, not read. Cavolini believes the caprifig to be the male tree and the fig the female of the same species. He further notes the difference between the fig receptacle and the seed, and how the former can come to maturity on account of its stronger attachment to the stem of the tree, while the seed, which is only attached to the pericarp by its vessels, requires pollination in order to mature. This pollination causes the juices in the fig to flow more freely, bringing both the

seed and receptacle to maturity. That some figs mature their receptacles and others do not depends on a defective structure, by which the juices from the stem of the tree are more or less obstructed in their flow into the fig's receptacle. As this obstruction is less or greater the fig requires more or less pollination to cause more or less sap to flow, while the seed, in order to attain maturity, always requires pollination. That the same variety of fig can mature in one locality without caprification, while in a different district it must be caprificated in order to mature its receptacle, depends upon differences in locality and soil. Cavolini's ideas are clearly expressed and to the point.

At the very end of the century a French botanist, Olivier, traveled in the Ottoman Empire, Egypt, Persia, and Greece, making a particular study of the fig. His descriptive work of his travels was published in Paris (year 9). Olivier came to the conclusion that caprification was a useless and ignorant proceeding, which should be abandoned. He says:

This operation, of which some authors, both ancient and modern, have spoken with admiration, appeared to me to be nothing else than a tribute which man pays to ignorance and prejudice. Caprification is unknown in many parts of the Levant, in Italy, in France, and in Spain, and begins to be abandoned in the Archipelago, where it used to be practiced, and which, nevertheless, still produce excellent figs for eating. If the operation was necessary, whether fecundation be effected by the fertilizing pollen dispersed in the air introducing itself into the mouth of the fig, or whether nature makes use of a little fly to transmit it from one fig to another, as is commonly believed, it is evident that the first fig in flower could not fecundate at the same time those that have already attained a certain size and those which are only just appearing in order to ripen two months later.

The knowledge which Olivier possessed of caprification was in reality most superficial and defective, and some of his statements are even false and misleading and not worthy of quotation, except for the fact that disbelievers in caprification have pointed to him as an eminent botanist, who had conclusively proved the delusiveness of the process in question. Olivier did not even know that it was the caprifig which was used for caprification, but stated that it was the common "figues fleurs," the brebas, or first-crop edible figs, which were hung on the trees. This also appears again in the last lines of his statement quoted above, beginning: "First fig in flower," etc. His statement that caprification was unknown in Italy and Spain is also incorrect.

In 1820 Giorgio Gallesio, a prominent Italian horticulturist, published his treatise on the fig. How far Gallesio's statements were based on investigations in nature are not known. Later writers on figs have endeavored to show that his theories were founded principally on book learning, and not on observation. I am not of that opinion, as his statements show a frankness and fairness entirely indicative of truthfulness. Gallesio holds that there are two races of figs—one

which requires caprification in order to mature its fruit, and one which matures without the aid of this operation. The different requirements between the two fig races depend upon a difference in construction of the figs, and each race retains its characteristics, regardless of the influences of soil and climate. The difference in construction lies in the ovary of the fig. Some figs have ovaries without ovules, and those figs which can not be fertilized can also not feel the action of the pollen from the caprifig. These are the mule figs. The other class of figs, with perfect ovules, are sensitive to the pollen, and under its influence develop perfect seeds. These he calls semi-mules. The fecundation causes the juices to flow to the fig and effect its maturity. The caprifig alone containing the pollen is, therefore, necessary, and the only way to apply it is through caprification.

Gallesio also describes a caprifig with only female flowers—"the fico semi-mula." His statement that the original wild caprifig bore only one crop of figs is shown by Solms-Laubach to be erroneous, or at least very improbable.

In the middle of our century the Italian botanist Guglielmo Gasparrini published a series of four different treatises upon figs and caprification, extending in time from 1845 to 1862. No one has contributed so much to our knowledge of caprification as Gasparrini, and no one has made as many original researches as he has. Gasparrini, as Olivier before him, takes a decided stand against caprification, believing himself warranted in so doing by the result of the experiments made by himself. Gasparrini's experiments have been by many considered conclusive and almost final, and his views have been adopted almost unchanged by later writers on the subject of caprification. While conceding that Gasparrini's experiments were scientific and fairly carefully made, and highly interesting and demonstrative, I hold that the main conclusion which he drew was singularly illogical, though it may have been warranted by the insufficiency of his experiments. Gasparrini's almost only, but fatal, error was that he experimented only on a few Italian figs, not even suspecting that there might be other figs differently constructed. From his observation he concluded that because "a few were so," therefore, "all must be so." Gasparrini's experiments are too elaborate to be here noticed in detail. Those who wish to further study the subject are referred to his respective works. A summary of his theories, experiments, and conclusions is found in *Biological Studies on Figs, Caprifigs, and Caprification*. A very short résumé must suffice here.

Gasparrini concluded that the caprifig belongs to a different species from the cultivated fig; that the *Blastophaga* is not necessary for pollination; that caprification is useless and injurious and should be abolished.

It is not intended to condemn Gasparrini's work, which, though believed by many to have been somewhat defective, has still proven

of much interest and value. His experiments have shown us that caprification does not hasten the maturity of the common fig, and that it is not the sting itself of the wasp which influences the setting of the fruit of the edible fig. They also show that many figs which are regularly caprificated by the fig growers require no caprification, and that, as far as these figs are concerned, caprification could be abandoned. This point is confirmed by the circumstance that these same figs mature in countries where no caprifigs are grown.

It is not easy to see how any other conclusions of importance can be drawn from the experiments of Gasparrini. It must always be regretted that he never thought of the possibility of there being any other race of figs than that one which he happened to have under his eye. How different, for instance, would his conclusions have been if he had had the true Smyrna figs to experiment on!

In our own times no one has given as much study to the fig question as Prof. H. Count Solms-Laubach. His researches were published in 1882, and contain a perfect mine of knowledge, partly compiled, partly his own investigations. While scientifically investigating his subject and studying the figs and the fig insects in Italy, Java, and France, it appears that he had no opportunity to make direct experiments in caprification, but founded his opinions principally on the experiments of Gasparrini. He sifts the knowledge of others with rare ability and patience, and adds numerous and interesting observations of his own. His researches are of the utmost importance. As a botanist he rejects, as insufficiently proven, Gasparrini's theory of parthenogenesis, and, showing that Brazilian figs produce no fertile seed, concludes that caprification is necessary for that purpose.

During his investigations in Java he discovered that most figs growing there consisted of female trees as well as of male trees, and he found that the male tree possessed a flower especially adapted to foster the *Blastophaga*, a kind of degenerated or differentiated female flower, which he calls the "gall flower." This gall flower has probably lost its power to produce seed. Returning home and investigating the caprifig, he found that even this fig contained this gall flower, almost exclusive of any real female flower. He further shows how different species of figs are inhabited by different species of *Blastophaga*. He also unconditionally adheres to the theory of the caprifig and the fig being of the same species. Later on he adopts the theory of Fr. Müller, that the edible fig is the female plant and the caprifig the male plant. But he was entirely unaware of the existence of a race of figs constructed differently from the common edible figs which he had investigated, and he shared the opinion of Gasparrini that all figs were affected by caprification in the same manner, though he recognized the absolute necessity of pollination and caprification in order that fertile seeds may be produced. But if caprification is not needed any more, it was once a necessity, ages ago, when the fig was

first brought into cultivation by man, and before the present race of figs, which requires no caprification in order to set and mature, had originated. The class of figs which the Italians considered as requiring caprification had been shown to set fruit without this operation; the class that once required caprification must, therefore, have been lost, and been superseded by a better, more modern class, evolved from the former. He comes to the following conclusion:

Caprification was once, ages ago, a necessity; it is now no more useful, but only a horticultural operation, transmitted from generation to generation, down to our time, and in its original form. Its scientific importance as means for judging the modifications undergone by our economic plants (*culturpflanzen*) in the course of ages can hardly be overestimated.

It is hardly necessary for me to remark that Solms-Laubach's conclusions were based on his belief that this race, once requiring caprification, has been lost, has "died out," as no longer of value. Now, if this race has not died out, but can be proven to be yet extant and to constitute our best figs, the conclusion arrived at by Solms-Laubach must fall. Professor Solms-Laubach has since acknowledged the correctness of this.

A late contribution from the author's knowledge of caprification is found in his *Biological Studies of Figs, Caprifigs, and Caprification*, already referred to several times. These experiments were conducted in various places in California, and have, in the author's judgment, conclusively proven that caprification is a process of pollination by the aid of wasps; that it is a necessity in order to cause the Smyrna figs to bear; that the first crop of San Pedro figs does not require caprification, while the second crop of this tribe of figs will not set and mature fruit without it. The writer has also shown that there is a fourth kind of flower in the fig—the mule flower. He has also pointed out for the first time that we possess five distinct tribes of edible figs, the nature of which he has described, and has endeavored to trace the phylogenetic origin, showing that while the Smyrna figs have descended from the female caprifig tree the other tribes may have descended from the male caprifig tree. From the nature of the seedlings grown from imported and caprified Smyrna seeds he has also demonstrated that caprification is a process of pollination and not one of irritation, as has been supposed by the majority of investigators since the time of Aristotle. The latest as well as the best work on caprification, however, is from the pen of Dr. L. O. Howard, of the United States Department of Agriculture. Dr. Howard is the only entomologist who has attacked this difficult subject with a thorough knowledge of insect life and its relationship to plants. As a consequence little in the life history of the *Blastophaga* now remains to be elucidated, and the reader who wishes a more detailed account of this subject is referred to Dr. Howard's work published in the *Yearbook of the Department of Agriculture for 1900*. It was published too late to be quoted in this paper.

CHAPTER V.

CLIMATIC CONDITIONS.

GENERAL REMARKS.

The climatic conditions under which the cultivated fig will thrive and bear fruit are less restricted than those which favor or disfavor many other fruits. What other fruit can be grown out-of-doors with moderate success through a district ranging from the south of Scotland to the Cape of Good Hope, from the shores of the Atlantic through Europe and Asia to China, from Chile to California and Oregon, and on the eastern coast as far north as Washington? Nevertheless, there are, necessarily, certain conditions which are particularly favorable to the cultivation of the fig. Unfortunately, the information at hand is very unsatisfactory, as the countries where fig culture has been most successful are those where the horticulturist has not found it necessary to invoke the aid of the scientist in securing good results. Aside from our own personal experiences, almost the only sources of information are consular reports and works of travel by northern tourists and explorers; but they seldom contain the information desired.

The warm, temperate climate of the Mediterranean region is the most favorable to the varieties of the fig that are useful for both drying and eating fresh. Even in this region some parts are much more favorable than others, and we look upon Smyrna, Sicily, Provence, Andalusia, and Algarve as ideal places and climates for the highest development of the fig. But even in these localities the areas are restricted, and in the study of climates and the search for ideal climatic conditions comparison must be made with such places as Aidin, Palermo, Draguignan, Solon, etc., in which the climatic conditions must be the standard with which to compare our own. It will be seen that the area of the most perfect fig culture nearly coincides with that of the olive. Taken as a whole, the olive and the fig thrive under the same conditions, but the accommodative powers of the fig are much greater than those of the olive; it quickly repairs injuries from frost and hurricanes and accommodates itself to almost any environment. But while the famous figs are grown in less than half a dozen localities, a first-class olive cult is spread over an immense territory and, remarkably enough, in localities where the finest figs are not found. The two cults, therefore, while agreeing in general, do not coincide in details, for the fig, while less exacting as regards climatic conditions than the olive, demands peculiarities in climate in order to attain perfection, which few localities can supply.

TEMPERATURE.

The proper temperature for the fig varies with different varieties. While some figs will mature with comparatively little heat, others require a great deal, and can hardly be given enough. Most excellent figs for the table may be grown where the heat is moderate, while varieties for drying require much more heat. If we take the figs of Smyrna, Kabylia, and Algarve as standard dried figs, as we must certainly do, then it is safe to say that the temperature in the shade during the drying, or rather during the maturing, of the figs should never, or seldom at least, exceed 100° F., or about 130° in the sun. Figs will, however, stand as much heat as the sun can give them, provided they are not exposed to the direct rays. However, since the best figs for drying are produced near Smyrna, where the heat seldom reaches over 100° F., we must conclude that a higher temperature in the shade is not desirable. Too strong direct heat and light may burn or scald the figs, thus bleaching and hardening the skin on the exposed side. Excessive heat during the season when the figs ripen is consequently undesirable.

In studying the effect of excess of temperature each variety of the fig must be considered. Some kinds are very hardy, comparing in this respect with peaches, and even apricots. The tender southern varieties of figs should never be exposed to a colder temperature than 16° F., even if well matured; and if the branches are immature, 18° F. will kill the trees to the ground. A young fig tree can endure much less than an old one; consequently, it often happens that trees during the first two or three years after planting are cut to the ground and killed by frosts of from 18° to 22° F., and very often the variety is at once condemned as unsuited to the region. As the trees grow older they become hardier, show less growth, and are less injured by frost. The first few years are therefore the most important ones, during which time the trees should be watched and protected in the winter. If brought safely over that period most varieties will be found hardy in the valleys of California. The writer has seen young Adriatic figs cut down to the soil three years in succession during temperatures of 18° F., and the same trees, after having successfully reached four years or over, were not injured by much heavier freezing. In the grounds of the Department of Agriculture, Washington, D. C., may be seen a real Smyrna fig tree which must have grown there a great many years, as it is 12 to 14 feet high and has never been protected. Similarly in the streets and yards of Washington there are quite a number of seedlings 2 or 3 feet and upward in height, which have sprung up from Smyrna fig seed. In order to facilitate the proper ripening of the figs it is necessary that the nights should be warm or moderately warm. Cold and chilly nights, even if the days are warm, will cause the figs to dry or remain hard, with little sugar.

RAINFALL AND MOISTURE.

Few fruit trees enjoy moisture as much as does the fig. In very moist or even wet soil the fig tree grows most luxuriantly and attains a high degree of development; but in such localities the quality of the fruit is inferior, being less sweet, insipid, or even sickening to the taste. Different varieties require different degrees of moisture in the soil, and in order to produce the best quality of fruit the soil should never be more than moist, not wet, at least not during the fruiting season. In Smyrna the yearly rainfall averages 25 inches, and this must be considered the standard rainfall required by or desirable for the fig designed for drying, provided the soil is of such a quality as will retain the moisture. With the proper cultivation of a good soil with the above average rainfall, even at the end of the dry season, moisture will be found a few inches below the surface sufficient to cause the soil to cohere when pressed. If drier than this the trees will suffer, both as regards wood and fruit, while if more moist the figs will be inferior. The rainfall should be all in the rainy or winter season and none after the figs have begun to mature. A shower of rain on mature or nearly mature figs is very injurious, causing the figs to break open, turn sour, and rot, and the crop may be a total loss. Moisture in the air, such as is caused by and following rain and fog, is also injurious to the fruit, although it favors the development of the tree. The fig requires a dry, but not too dry, air, in order to produce superior fruit. Still, good and very superior fruit is grown close to the ocean, but out of reach of fogs. Some of the Smyrna figs are grown within the sight of the Mediterranean near Ephesus, and the figs of Algarve and Malaga are similarly not far from the sea. In California excellent figs are grown around San Francisco Bay, though not near to the shore. But fogs are always injurious to figs, preventing the development of sugar and injuring the color of the skin. Even dew is not desirable, especially when the figs are ripening, and no figs should be picked before the dew is thoroughly evaporated.

WINDS.

Winds are supposed to favor the maturing of the figs, provided they are dry and not too warm. In Smyrna the finest figs are those gathered when the dry north wind is blowing. The fig can hardly be injured by ordinary heavy winds, as there are few trees which grow as evenly balanced as the fig. This fact makes the fig especially suitable for wind-breaks during the summer months, while its deciduous character unsuits it for this purpose in the winter.

IDEAL CLIMATIC CONDITIONS FOR FIGS.

Summarizing the general climatic conditions favorable for the most perfect development of the fig, we have the following:

- (1) Two seasons, one rainy and one dry, the latter during the warm

season of the year. The more distinct these seasons the better, showers during the ripening season being very injurious.

(2) Warm, dry winds during the ripening of the figs, accompanied by sunshine and absence of clouds and fog; the temperature in the shade not regularly to exceed 100° F.

(3) During the winter the thermometer should not fall below 18° F.

(4) Natural rainfall of not less than 25 inches, confined to the winter and spring months of the year, say from November to May.

(5) Warm nights during the summer also favor the fig, its development, and its quality.

SOILS.

GENERAL REMARKS.

The fig will grow in almost any soil, and with an abundant water supply will do fairly well even in somewhat poor soils. Lime soils are more favorable to the fruit than others. Whatever the soil is, it must, in order to secure the best results, be warm, have the property of retaining moisture when properly cultivated, and it should be deep, well drained, and not underlaid by hardpan or bed rock. Figs will grow in almost all places, but with rocky ledges or hardpan close to the surface the trees will suffer in times of drought, and in badly drained soils the fruit will be of inferior quality. The most favorable soil is one which is deep, loamy, soft, full of humus, and with an abundance of lime. The latter is indispensable in producing a superior drying fig. In very dry soils the fig is small and woody, most varieties requiring continually moist soils. Bottom lands and mesas or table lands adjoining rivers are the most suitable places for fig orchards. The alluvial soils in such localities generally have the faculty of retaining moisture so necessary to produce pulpy figs. It is an additional advantage if these soils are sandy, provided they also are rich in soluble plant food. Not all sandy soils are suitable for figs; only those are which are really rich in plant food and in lime. Very heavy clay or adobe soils should be avoided, especially in localities which are naturally cold and damp. Alkali soils are not suited to figs, as the alkali tends to counteract the necessary formation of sugar in the fruit. It is well known that both carbonate of sodium and sulphate of sodium change the crystalline properties of such fruit sugars as those contained in beets and cane, and if present in too large quantities will prevent the formation of sufficient sugar to pay the grower for his work. Figs, as well as raisin grapes and beets, will grow in alkali lands and produce, but the fruit should be used for table only and not for drying or for a product where sugar is the most important part.

SOILS IN THE EUROPEAN FIG DISTRICTS.

No chemical analysis of the best fig soils has ever been made. The soil in the Meander Valley, near Smyrna, the principal fig district in the world, is a rich and loose alluvial loam of great depth, containing

a large percentage of lime and potash. In Sicily, in the Palermo district, where the largest and sweetest figs of Italy are grown, the soil is mostly of an alluvial nature, also containing much lime. The soils of Algarve, in Portugal, are principally mesa soils of a semialluvial nature. It will be remembered that until within a comparatively few years the Algarve figs were considered the best in the market, but later on Smyrna, through care in selection and curing, took the lead. Some of the best Italian figs—those from the province of Catania, in Sicily, and those from Pozzuoli, not far from Naples—are grown on volcanic soils, and to the lightness and other good qualities of this soil is attributed the good quality of the figs. The figs from Pozzuoli are said to bring a better price in the Naples market than any of those from southern Italy.

RECAPITULATION.

- (1) Edible figs, to be eaten fresh, are less exacting as to soil; they require somewhat more moisture in the soil.
- (2) Figs for drying require warm, moderately dry, and quite sandy, but especially limy, soils.
- (3) Heavy wet soils produce coarse figs, and so do heavy clayey soils generally.
- (4) Sandy soils produce sweet figs of light color when dried.

POSSIBILITIES OF FIG CULTURE IN COLD CLIMATES.

Although fig culture will always be carried on most successfully and profitably in semitropical climates as at present, the fig tree readily accommodates itself to less favorable regions and may be grown in many other localities. It appears that the real barriers to fig culture are short and cold summers. With warm days and long summers, such as are found in North America and central parts of Asia, a successful culture of figs might be accomplished even with rigorous winters. In another part of this volume the writer describes how, by covering the fig trees either with mats or with earth, successful crops are raised far outside of the favored regions of the fig, and the figs thus produced are not poor in quality, but are really good, sweet, juicy, and wholesome. Such fig culture is now practiced in the vicinity of Paris, in various places in England, and even in the highlands of central Asia, where the winters are extremely rigorous. In the khanates of Bokhara and Samarkand figs, pomegranates, and grapevines are grown with winter protection; also in the vicinity of Pekin straw protection is required. Some varieties of figs require much less heat and can stand much more cold than others, one of the hardiest varieties being the semidwarf growing Brown Turkey, with its short and crooked branches and its deeply cut leaves. There is no doubt that figs producing the first crop for the table could be grown profitably over a vast area of central North America and Europe in places where this delicious fruit is now entirely unknown in its fresh state.

CHAPTER VI.

PROPAGATION OF THE FIG.

GENERAL REMARKS.

The fig tree may be propagated in various ways. Few trees are as easily grown and few require less skill and previous experience. The fig tree may be started in the orchard in the very place where it is destined to remain, or it may be propagated in the nursery and later on transplanted. The former method can be used only when the desired number of cuttings is available. Under favorable conditions it is the best way to start a fig orchard, as this method is less expensive and requires less time. But conditions may make other modes of propagation necessary, especially when large cuttings of the varieties required are not to be had or are too expensive to justify their use.

While with proper care a fig orchard is very easily started, some little neglect and ignorance of detail frequently cause great loss of trees during the first season. It may be truly said that the fig is both the easiest and the most difficult tree to grow.

CUTTINGS OR ROOTED TREES.

The relative value of cuttings or rooted trees is entirely determined by circumstances, such as the mode of planting, care given, experience of the planter, facility with which one or the other may be procured, etc. If cuttings of the desired size, age, form, and structure can be had, they are sure to prove very much the cheapest. If the soil can be kept in proper condition and if the cuttings are fresh and healthy, cuttings will be found preferable to trees in starting a new plantation. Cuttings, if fresh and of proper quality otherwise, have this superiority over fig trees, that they can always be depended upon to grow if given reasonable care. The cutting of the fig tree is remarkably hardy, does not dry out readily, and if once injured can be readily restored to life without much risk of a greater loss than a few per cent at most, provided, of course, the drying out has not gone beyond a certain limit. Rooted fig trees are in our country easy to get, as they are grown here for sale. They have also the advantage of being all of a certain size, can make standard trees at once, and, provided they are fresh, they will bear sooner than cuttings. But rooted fig trees have some drawbacks not possessed by other fruit trees, except, perhaps, the olive. The fact is noted that if the trees

are allowed to get dry before being reset they are very liable to die back to the ground and thus become even of less value than cuttings. Many failures in fig plantations arise from this cause. The fault lies partly with the sender or the nurseryman; partly, or more frequently, with the receiver, whose knowledge of caring for the trees has been at fault. If the trees are cared for properly little or no loss is probable. A plantation started from trees will be more uniform, will bear quicker, but will cost more than one started from cuttings. It should be remembered that cuttings of the proper size for planting in the open ground must be much larger than cuttings to be first planted in nursery rows. For the former purpose long cuttings are required; for the latter even the smallest will prove valuable. Unlike other nursery-grown trees, fig trees are always started from cuttings. A cutting started direct in the orchard is therefore likely to make as good or even a better tree than one that has been transplanted. If long and proper cuttings can be had they are preferable to trees, but well-grown trees are preferable to small cuttings.

FRESH AND DRY CUTTINGS.

The main point in planting a fig orchard from cuttings is that the cuttings should be perfectly fresh. To be sure of this, each cutting should be clipped at both its upper and lower ends just before planting, except in case the top of a cutting ends in a terminal bud. Of course, the clipping is only to learn the proper state of the cutting. The cutting is fresh if an abundance of milky juice exudes from the inner bark or cambium layer immediately when the cut is made. The freer the juice flows the better the cutting, while if only a few tiny drops exude here and there the cutting is unfit for planting and must be revived. If fresh, the cutting should be plump, and the year's wood should be glossy, bulging, and no sign of shrinkage should be seen. The buds of a cutting which is in proper condition should also be plump and the outside scale of the bud should not be dried. When this scale is torn off the milky sap should exude from the wound.

Such plump fig cuttings will readily grow, and if each cutting is examined before planting, and if the planting is done in proper soil and good care is given, there should be less than 1 per cent loss from failure to grow.

A dry cutting may be easily detected. Its wood is shriveled, and when cut transversely little or no milky sap exudes, or the sap will be thin and watery. When the inner green bark and cambium are lifted with a sharp knife they appear dry and shrunken or even discolored. The buds on a bad cutting are more or less dry; the outside scales are shrunken and do not closely cover the interior ones, and they appear hard when pressed with the fingers. These characteristics of the buds are sure signs as to the quality of the cutting, as they can be detected at a glance, even at a distance. A dry cutting has a

different color from a fresh one, the former being grayish and dull, the latter being blackish or dark and brilliant, reflecting the sun or light.

BEST TIME FOR MAKING CUTTINGS.

The fig tree is never entirely dormant, as there is always some sap moving. Even in winter, when all the leaves have fallen, a cut in the wood will cause the sap to exude. But the fig has periods of greater or lesser activity, the latter beginning in the fall of the year after the leaves have fallen. This period should be chosen for propagating the fig. The flow of sap at that time does not interfere with the rooting of the cuttings, as it is the downward flow of the sap which produces the callus from which the roots develop. Later, when the leaves have started, the fig roots with more difficulty. The proper time for cuttings is therefore in November and December, and if the ground is warm and sandy, the sooner they are planted the better. If the ground is very cool and clayey, the making of cuttings, or at least their planting, should be postponed until February or March, although the earliest planted cuttings always prove the best, provided the conditions have been proper. Cuttings which are to be sent away should always be cut early, as they stand long shipments better than cuttings which have been made late. The latter contain much more sap, and on this account are less dormant. For planting out of doors, the earlier the cuttings are made after the frost has caused the leaves to fall the better.

HOW TO MAKE CUTTINGS.

If a large fig plantation is to be started it is most practical to make the different sizes of cuttings at the same time and to assort them afterwards. If cuttings are required year after year, it is best to have certain trees set apart for that purpose, as when fruiting trees are cut back they will cease to bear properly for one or more years, or they will bear inferior fruit. The branches from which the cuttings are to be made should be cut back at once to the main stem of the tree. After being thrown to the ground the large limbs should be sawed or cut off immediately and assorted as to size. After being conveyed to a cool place they should be protected from the sun and wind. This may be done either by heeling the cuttings in the ground if they are apt to remain there for some length of time—a week or ten days—before being cut up. But if they are to be worked up at once they may be merely covered with straw, wet sacks, or blankets. If covered at all they must be covered well; and not more than one-tenth part of their whole length should in any case be exposed to the sun or winds. This refers also to the heeling in, when nine-tenths of the cuttings should be below the soil.

The large cuttings should be made up first. The large limbs should be sawed off square across and cut, as straight as possible, in

lengths of from 3 to 4 feet. These large cuttings may be at once transferred to the orchard and planted directly where they are to remain. If this can not be done, these large cuttings may also be heeled in. This should be done immediately, and if possible the same day as cut.

The small cuttings may be cut up at leisure in the shade. If they have been previously heeled in they should first be washed, as the soil will spoil the shears and retard the work generally. It is the most profitable to make three different grades of cuttings, all grades being cut at the same time. Have the men sitting on low boxes or tripod chairs, each man with a pile of rough branches or large cuttings

before him, and three boxes of different sizes at his side, these latter for the reception of the newly made cuttings. As a rule the different sizes may be 12 to 14 inches for the largest and thickest, 6 inches for the medium size, while the tips or shortest branches may be made 1 or 2 inches in length and serve as the smallest grade. The two largest sizes should be placed in layers with the butt ends in the same direction. This is important, as otherwise many of the cuttings will be planted upside down. The small tips may be thrown promiscuously into the box.

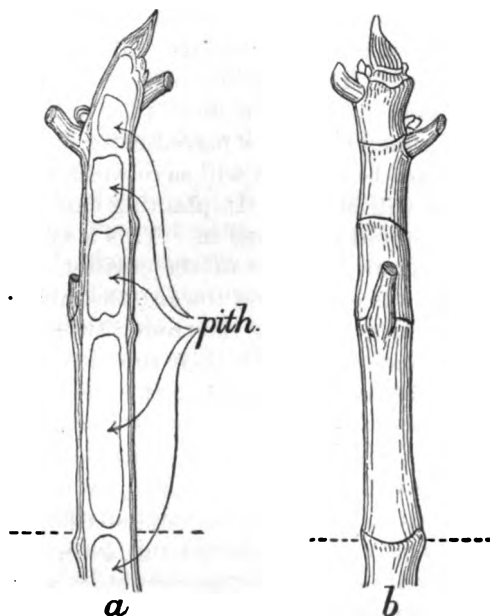


FIG. 19.—Fig cuttings: *a* showing the pith and nodes at the joints.

In making the cuttings it is necessary that the shears should be kept sharp, and a hone should always be handy for that purpose. Care should be taken to cut exactly at the joint, where there is no pith visible. By splitting a fig-cutting lengthwise it will be seen that the pith does not extend through the joint, but that there is a place in the joint where the wood is solid. (See fig. 19.) If the cut is made exactly in this solid part, both the bottom end of one cutting and the top end of the one below will be closed by solid, woody matter, and not exhibit any pith. The advantage gained is that the solid bottom end will root easier, while the top end will be protected from insect borers, which often work down through the pith from the point where it is exposed. The part of the cutting thus injured will dry and die. If the pith is not exposed, the borer can not make a ready entrance.

It is hardly necessary to add that the proper place for making cuttings is in a large shed, or under the shade of a large tree.

The following are the main points in making cuttings:

- (1) The operation must be performed in the shade.
- (2) The shears should be very sharp.
- (3) Large and small cuttings are best made at the same time.
- (4) Grade the cuttings as soon as made.
- (5) The cut to be made in the joints where the wood is solid.
- (6) The larger cuttings to be placed in boxes, with the butt ends all in one direction.

CARE OF CUTTINGS AFTER THEY ARE MADE.

Many failures arise from want of care of the cuttings after they have been made. A cutting should be fresh, or at least full of sap, before planting in nursery or orchard. The best method is to plant the cuttings as soon as they are made. If this be done they should not be disturbed from the boxes in which they were placed after being cut; and to transfer the boxes at once to the field will save work, and the chance of mixing the cuttings will be less. If planting can not be done immediately, the cuttings should be heeled in. This may be done by digging a trench as deep as half the size of the cutting, the soil being thrown up always on the same side, and toward the south if possible, thus forming an embankment, making the trench twice as deep. The cuttings are then put in slanting, with their tops leaning against the loose soil. The soil to be used for covering the trench is dug out of the opposite side and from the next trench to be dug. First the lower part of the trench is filled in, then loose soil is heaped in around the cuttings to within a few inches of their tops. Another layer of cuttings is then put on against this soil, the original trench all the time being made wider. The cuttings should not protrude more than a few inches. Thus heeled in, the cuttings should be kept slightly moist, but not wet. If too moist the cuttings will make root quickly. This is to be avoided as much as possible, as these roots will all die in replanting and rob the cutting of considerable sap and life force.

If there is danger of the cuttings rooting too soon they may be taken out and dried in the air for a few hours or longer, according to the weather, and then afterwards be put back into the trench. Such drying does not injure the cuttings, provided proper care is taken in not drying too much. In this manner cuttings may be kept in good condition for several months and until very late in the spring. The soil in the trench should be kept firm in order that the drying winds may not enter or that mold may not form. After every watering the holes formed by the settling of the soil should be filled in and trodden down. If the cuttings have from any cause become dry they should at once be revived. This can be done by placing them in a ditch or

tub filled with water, running water being best. One night in water will generally revive most cuttings—that is, if they are not absolutely dead—and cause them to become plump again. Some cuttings in every lot are, however, irreparably injured by drying out, and these should, if the least shriveled, be thrown out at planting and no risk taken with them. If the variety is very valuable these injured cuttings may possibly be saved, and they should be cared for separately. The very small tips or single-eye fig cuttings should be allowed to remain in boxes, covered with moist or slightly damp sand in such a way that no part of them remains exposed. All such tips should be grown under glass or cover or in separate beds, where they can be given necessary care.

The following are the main points in caring for the cuttings:

- (1) Plant, if possible, as soon as made.
- (2) Do not expose to the sun.
- (3) Heel in a trench, leaving not more than two eyes exposed.
- (4) Tamp the soil in the trench so as to exclude the air and prevent drying.
- (5) Keep moist, but not wet.
- (6) Prevent rooting or callusing by occasional drying.
- (7) Examine the cuttings every two days.
- (8) Very short cuttings should be entirely covered.
- (9) If dried out, revive at once by immersing in water or by covering entirely with wet soil.
- (10) Never cover with wet straw.
- (11) If callused when planting, cut off the callused part.

PLANTING CUTTINGS IN NURSERY ROWS.

Mark off the field by driving pegs in two parallel rows, the pegs in each row to be 4 feet apart. The best chain or line that can be used is five-ply twisted wire, generally known as "cable." After the pegs are set stretch the cable between two opposite pegs, and while the cable rests on the ground cut out a V-trench along the cable by means of the Italian broad hoe. In making the trench the flat edge of the hoe is slapped on the ground as close to the cable as possible and parallel to it. By pulling the hoe toward the workman a small trench is excavated which can be made sufficiently deep by twice repeating the stroke. Three men can perform this work to the best advantage—one at each end and one in the center of the cable. As soon as the cable is stretched all three men begin the digging of the trench. The cuttings should be planted by a separate gang of men as soon as each trench is ready. The planting is simple. The cuttings are placed vertically against the perpendicular side of the trench, about 10 inches apart, and sufficiently deep to leave one eye above the soil and one eye just in the surface line. As soon as a part of a row of cuttings is set, one man should follow with an Italian hoe and scrape the soil

toward the cuttings. When he has caught up with the planter he should return and tamp the soil on both sides of the cuttings, not only by walking with one foot on each side of the row, but by using as much force as possible in pressing the soil hard. The soil can not be pressed too hard, provided it is not wet and soggy. If irrigation can not be had at once, or if the weather is very warm and dry, it is advisable to pull loose soil to the very top of the cuttings after the tamping is over.

This leaves only the very tops exposed or just in the soil, and prevents the cuttings from drying out. This entire covering over is also a most excellent way of reviving cuttings which have been planted, but which, from some cause or other, have become shriveled. A few days of shade will revive them, and the soil may be either pulled away again or be left. The sprouts of the figs will be able to push through if the covering is not over 2 inches thick.

In the directions above given the following points are to be noted as of special importance:

- (1) Uniform distance between the rows.
- (2) Absolutely straight rows.
- (3) The planting of cuttings at once, after the trench is scooped out.
- (4) Covering the trench at once after planting.
- (5) Tamping the soil very hard.
- (6) The shading of the cuttings by loose soil.
- (7) Prevention of the exposure of more than one eye.

PLANTING SMALL CUTTINGS IN NURSERY.

The planting of very small cuttings of 4 to 6 inches in length should be done in low beds in irrigated districts, or, if in moist places, in elevated beds. The low beds should be absolutely level and surrounded by a low ridge in order to check the water which is to be conducted by a small ditch to the bed in such a way that the whole bed may be flooded at once. After the bed has been prepared the soil should be dug up and raked loose. A small V-formed trench is then excavated from one end of the bed to the other and the cuttings placed in this about 3 inches apart. The whole bed is filled with cuttings in this way. Only one eye of each cutting should be left out of the ground. When planted the bed should be flooded at once and covered with well-rotted straw in which all seeds have been destroyed by fermentation. Fresh straw will bring too many weeds and will, besides, injure the cuttings by attracting and reflecting intense sun heat. Such beds of cuttings are apt to dry out very quickly and require a great deal of water. If properly cared for they will make fine but small trees, suited for planting in nursery rows the following season. During the growing season the plants should be suckered and only one shoot allowed to grow. The terminal buds of the plants should be kept growing until the latter

part of September, when they should be checked by keeping dry. (See fig. 20.)

The following points are to be observed in planting small cuttings out of doors:

- (1) Plant in beds absolutely level.
- (2) Expose only one eye.
- (3) Keep constantly moist.
- (4) Cover with well-rotted straw.
- (5) Allow only a single shoot.
- (6) Allow no growth after September.
- (7) Observe the terminal bud daily, and irrigate

the moment the growth is checked, which is indicated by the "heart leaves" becoming stunted and dry.

PLANTING SINGLE EYES.

The fig propagates readily from single eyes. Those that are saved in pruning and in making cuttings should not be allowed to be kept covered more than two days, as they begin to callus almost at once, and when once callused they do not readily stand moving. The best place for planting single eyes is in a frame covered by glass, canvas, or laths. Make the bed very level and

water freely. The soil in the bed should consist of three-fourths pure sand, but should not contain manure. Plant the eyes about 3 inches apart each way and cover the eyes about $1\frac{1}{2}$ inches with sharp, pure sand. Do not water for several days; keep only moist, not wet. The eye should be placed horizontally. The single-eye cutting is made either by cutting the wood across on each side of the eye, thus preserving the thickness of the wood intact, or by splitting the wood lengthwise. In the latter case the whole of the flat surface will callus and root. (See fig. 20.)

The object in planting single eyes is simply to procure plants of rare varieties. For ordinary kinds it is not worth the trouble to save

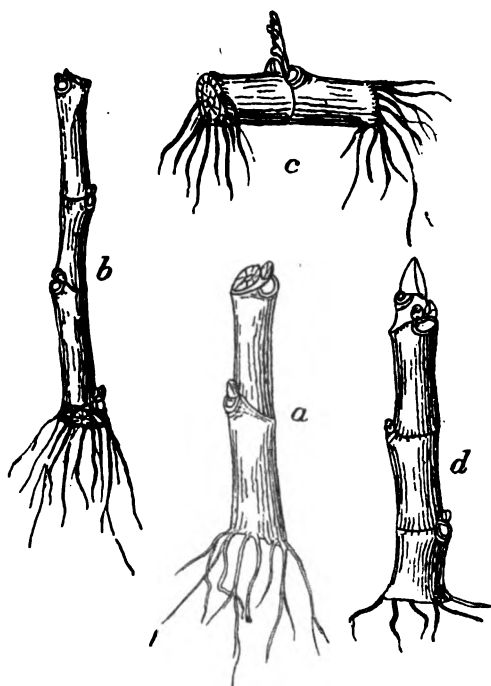


FIG. 20.—a, b, d, Small rooted cuttings of figs; c, a single-eye cutting.

the small cuttings or the single eyes. A cutting which is badly dried should first be soaked or revived, then the eyes cut out as above and planted separately. This is preferable to planting any of the dry wood.

SUCKERS.

Figs may be propagated readily from suckers or so-called water-shoots, which spring up in abundance at the base of older trees. Such trees will bear as much and as good fruit as those grown from cuttings, but they are supposed by some growers to produce a greater quantity of objectionable suckers, which must be removed several times during the year. For cuttings such suckers are not as well suited, as the wood is very long between joints and generally is less well matured than the regular branches. Cuttings from branches are therefore to be preferred. When suckers are used they should be treated exactly like cuttings or rooted trees. When suckers are planted directly in the orchard care should be taken to set the butt end containing the few rootlets sufficiently deep in order that it may not dry out. It should be set just as deep as one would plant a cutting. The top of a sucker need not be cut back, but may be left a foot or two above the soil, just like a tree, provided, however, that it has been detached from the mother trunk with at least a few adhering rootlets.

BUDDING AND GRAFTING.

GENERAL REMARKS.

The fig may be either budded or grafted, preferably the latter; but there is little advantage in doing so, except when it is desirable to change a tree of one variety into another more desirable, or when it is found advantageous to give a weak-growing variety a strong and vigorous root and stock. Nurseymen's fig trees intended for sale are never grafted or budded, but are always grown from cuttings. Many people mistake the suckers of growing trees for suckers from the root below a supposed graft. Such suckers differ always somewhat in leaf from the older branches, but unless it is known with certainty that the tree is grafted it is safe to assume that the strange-looking suckers belong to the same kind as the parent fruiting tree.

The time for budding and grafting is in winter, when the sap is comparatively dormant. Fig trees, unlike other trees, are never entirely dormant, and in order to succeed in grafting it is of importance to have as little flow of sap as possible, else the sap will throw off the bud.

BUDDING.

Fig trees are seldom budded, as grafting is much preferable. Still, if budding is desired as a curiosity it may be done. It is believed, however, that budded trees will not make as strong trees as those

grafted. Both in grafting and budding the fig the same operation must be had as in budding and grafting the walnut. A few remarks regarding budding may suffice. The best form of bud to be used in budding the fig is the ring bud. The first operation is to girdle the branch which is to be budded, making the girdle cover the site of an eye. Then take from the scion a girdle of exactly the same width and place this in position on the branch in place of the one removed. It is always best to place the new bud exactly over the spot where the old one was located, or, in other words, the ring bud taken from the stock is replaced by one as similar as possible from the scion. If the old branch is larger than the new one from which the bud is taken, enough bark should be left on the stock to allow the new bark to touch everywhere. The ring bud must fit exactly the place from which the bark was removed, especially at the upper margin and at the back. After the bud is inserted, tie firmly with cotton twine and wax well and do not cut back the top until the new bud has fully taken and grown several inches. Then cut back to one bud above the new bud. Destroy this upper bud by pinching, leaving only one leaf to draw the sap. After the new bud has grown several feet this old top may be entirely removed, either at once or during the following winter. In order to insure success the air should be well excluded by grafting wax from both buds and grafts.

GRAFTING.

If proper care is taken, the grafting of fig trees is not a difficult matter. Both scions and stock should be as dormant as possible, the best time for this being in January, though grafting may be done as late as in March. Only poor success will be had in grafting after the leaves begin to show and the sap flows readily. The following account of grafting the fig is mainly based on the experience of Mr. John Rock, who has brought the grafting of fig trees to great perfection.

SCION.

The best scion or wood is two years' wood, because it possesses less pith than one-year-old wood. End grafts or scions with top bud are the best. The form of the scion must be wedge-shaped, not only from top to bottom, but from front to back, and only one of the surfaces cut must show any pith. The side of the scion is placed toward the center of the stock, while of course the other side of the scion, which shows no pith, is placed toward the back or outward side of the stock. In order to have the scion properly cut the pith on the one side must be situated very low down, near the bottom of the scion. If situated higher up, the other side is sure to show some pith, too, which will be greatly detrimental to the future tree. (See fig. 21.)

Incipient fruit buds must be nipped off from the scions. The scions figured are of natural size and exact copies of those actually in use.

Terminal scions are the best. If other scions are to be used, the top cut should be made one-half inch above the top bud. This cut

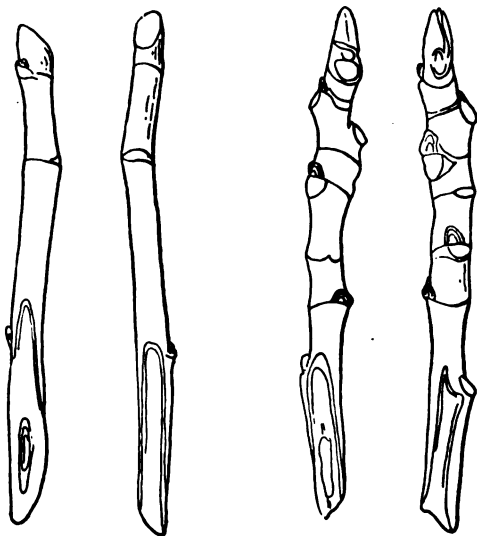


FIG. 21.—Fig scions for grafting—John Rock's method.

should be somewhat slanting. The front part of the wedge—that is, the part or face with the most bark surface and the one which when inserted will face outward—must have a bud at its upper end. Thus, in making the scion, begin by placing the knife close to a bud and then draw the knife downward. This is best seen in the illustration.

STOCK.

Any limb of an old fig tree may be grafted, provided it is healthy and not

sunburnt. The limb is cut squarely off or slightly slanting. The best size of limbs is probably about 2 inches in diameter. The cut should be made at a joint, as there is less pith there than anywhere else. This cut is best made with a saw. Many cuttings may be grafted into every tree, but it is of the utmost importance that, according to the size of the tree, one or two branches should be left entire, in order that the sap may be drawn into the old tree. (See fig. 25.) If all the branches are grafted and no large branches left untouched the old tree will die through the stagnation of sap. In old trees one or two large branches are left. In smaller or very small trees it will suffice to leave some twigs or slender yearling branches to draw the sap.

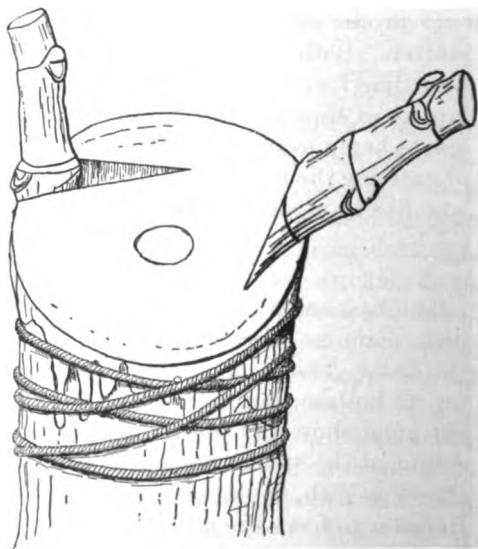


FIG. 22.—Scions inserted in a fig branch—John Rock's method.

CLEFT.

Smaller stocks require only one graft, but in the larger ones it is best to insert two or three grafts. Each graft is inserted in a cleft. This cleft, or slot, should be made with a knife or wedge and not with a saw, as the latter will make an uneven surface. The direction of the cleft should not be exactly parallel with the long axis of the stock, but should form with it a small angle, pointing toward the center of the branch, and it should not be so long as to cross the center. If pointing straight downward it will cause the stock to split, and if it crosses the center it may also cause the stock to split off. At any rate, it will not be properly kept in place. On the other hand, the upper part of the cleft, which crosses the cut-off surface of the stock, must not go through to the bark on the opposite side of the stock. The cleft is made on one side of the center, between the pith and the bark (see fig. 22), and must on no account cross the pith. If this is done the tree will be ruined.

INSERTING THE GRAFT.

When the scion is properly inserted in the stock it will show the following features: Its lower wedge-shaped part will point slightly toward the center of the stock and the median longitudinal diameter of the branch. The upper free part makes a small angle with the squarely cut-off surface of the stock. Thus the scion and stock are not parallel. At the junction of the scion and the stock is situated, facing outward, the lower bud or eye of the scion. Of the two planed-off surfaces of the scion, the one with the pith faces inward toward the pith of the stock. The inner green layer, or cambium, of scion and stock must touch at several points. (See fig. 23.)

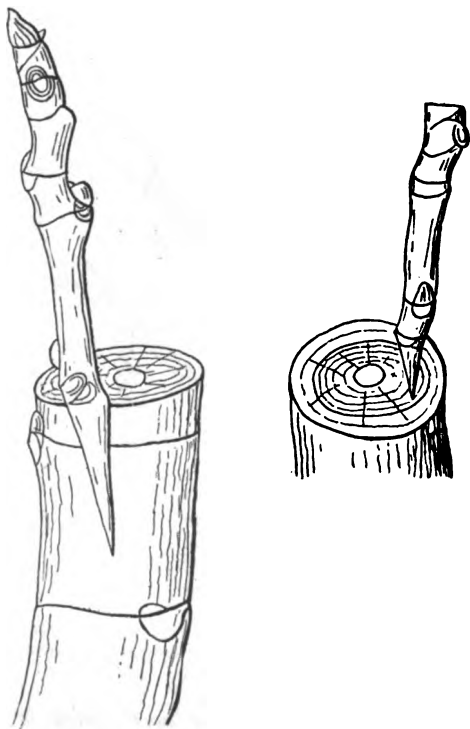


FIG. 23.—Two fig branches, showing manner of inserting the scions.

TREATMENT.

The scion is firmly tied with cotton twine, and the upper surface of the stock as well as the lower part of the scion must be well covered with grafting wax in order to fully exclude air, rain, damp, and wind.

After growth has begun, all the eyes of the scions should be allowed to grow for several months, but when they get to be too large and when there will be danger of the grafts being blown or broken off, the new, young, green wood must be cut back in such a way as to steady the graft. The growing branches of the graft must be tied to stout stakes, two, three, or more of which are required at every tree. (See fig. 27.) If the growing branches of the grafts are not tied securely they will with certainty blow off or break off by their own

weight. These stakes must remain during the whole first year. When the scions have grown and attained one year the large or small branches of the original stock which were left to draw sap may be cut off or grafted, if necessary. After the scions have started to grow well it is necessary to cut open the strings with which the cleft was tied, or they will cut into the wood. Then new strings are tied and new wax is put on as before. The cutting back of green wood and branches should be done gradually.

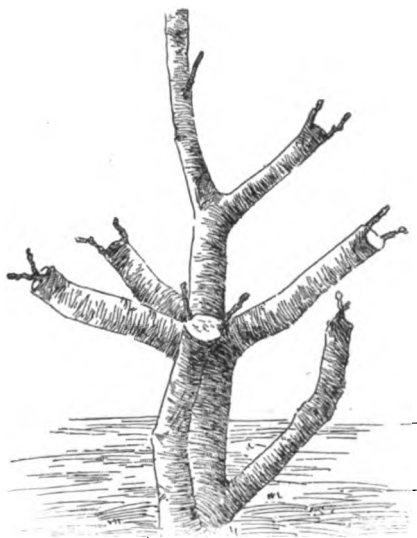


FIG. 24.—Fig tree just grafted. One branch is left to draw the sap. The straw covering to protect the tree has been omitted.

PROTECTION FROM SUNBURN.

It is of the utmost importance that the trunk of the old fig tree or stock should be covered with tulle or flag, or otherwise protected, on the south and west sides, or sun, wind, and borers will ruin the tree. The fig, while a tropical tree, will not stand the exposure of its bark to the sun or wind, except in winter. It shares this peculiarity with most evergreen trees. (See fig. 26.)

SHIPPING CUTTINGS.

Fig cuttings are much less susceptible of being damaged in shipping than fig trees with large, developed roots. If accidentally injured by drying, they may be revived more readily than fig trees or most other kinds of cuttings. In shipping long distances great care should be taken in proper packing. If properly packed fig cuttings may be

consigned on a voyage of three or four months and arrive at their destination in good condition. The style of packing must vary according to the distance and time of voyage, and also according to whether the cuttings are to be sent by mail, by freight, or other conveyance. In shipping cuttings to localities within one or two days' journey no special care is required. The cuttings should be tied in bundles of 50 to 100, as may be most convenient, two stout baling ropes being required, and tied one at each end of the bundle. A sack should then be slipped outside of the bundle, and if the weather is warm and dry, straw should be packed tightly between the cuttings and the sack, and the bag then stitched up. Dry-goods boxes may in some instances be preferred to sacks. Damp straw may be used for a week's trip, in which case a box should always be used. For longer distances the cuttings should be packed in dry charcoal and sealed in tin or in moss. The former is a most excellent packing and safe for a two months' journey, but has the fault that when the boxes are opened at the custom-house the charcoal will run out and the cuttings quickly dry. In all such cases the use of sphagnum moss must be substituted for charcoal. This moss is sold in pressed

bales, is comparatively very cheap, and weighs but little. The moss is first made quite wet with water and then squeezed dry with the hands or by a press. A tight box is selected, the sides of which should be braced and bound with light irons. Along the inner sides of the box nail oiled paper, folding the paper in the corners. Put first a thick layer of squeezed moss in the bottom of the box, then a layer of cuttings, then a less thick layer of moss, another layer of cuttings, and so on. A thicker layer of moss should be placed on the top similarly

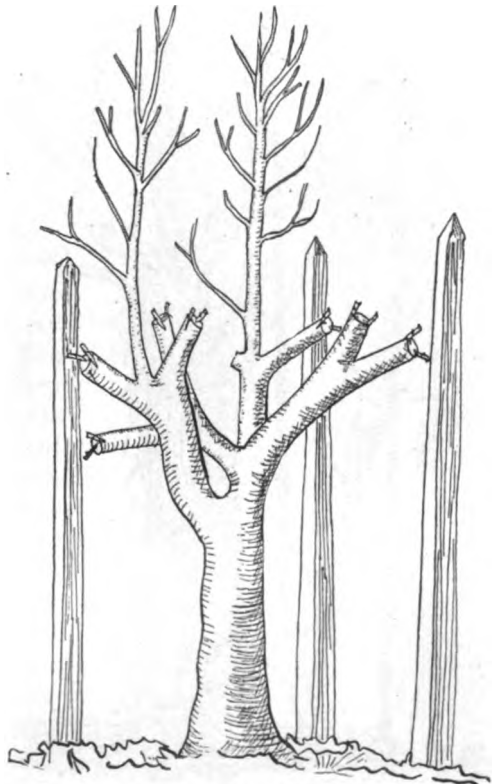


FIG. 25.—A fig tree just grafted. Two branches are left to draw sap. There are three stakes for supporting the growing scions. The straw or flag covering necessary to protect the stem of the main tree has been omitted.

to that on the sides, and all should be covered with oiled paper. Another good way is to tie the cuttings together in small bundles of 8 or 10, and treat these bundles as single cuttings. A more solid packing is the result. Very large boxes should never be used. A box 1 foot wide and 1 foot deep by 18 inches long is of a good size, is easily handled, and not readily broken. When the top is screwed on and the box turned over there should be no shaking inside, but all should be perfectly solid.

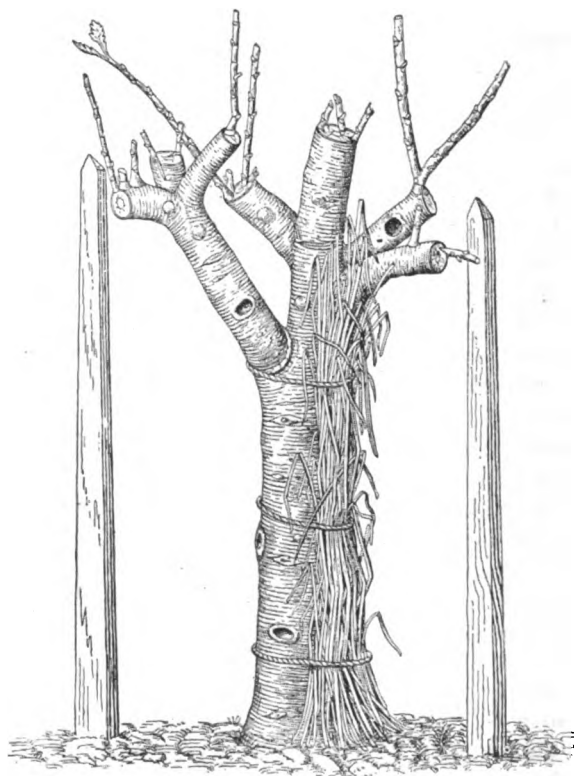


FIG. 23.—A grafted fig tree second season from grafting. Most of the scions are 1 year old from the graft and have just been cut back. Several small scions have just been inserted in the branches which were left growing to draw sap during last year. John Rock's method.

A yet safer way is to cover each little bundle with plenty of moss, then outside of the moss wrap a stout paper, oiled or paraffin paper to be preferred. The bundles are to be kept steady in the box with plenty of moss. The points to be especially observed are to squeeze the water out of the moss well and to pack so that the cuttings will not move. If they move in the beginning they will do so to a greater extent as the moss gradually dries, and the cuttings will dry through the air admitted to the box. Cuttings well packed in very

small boxes or in oiled paper and moss may be safely sent by mail, and will not dry out for one or two weeks. Such bundles must be tied very solidly. It is always preferable to dip all cut and exposed surfaces in melted wax, grafting wax to be preferred. This of course prevents the cuttings from drying out rapidly and insures greater safety. If a few cuttings only are sent, each one should be sealed with wax, and then wrapped first in paraffin paper and then in tinfoil.

SHIPPING LARGE FIG TREES.

Large trees suitable for planting are generally sent in bales, covered with flag, tule, or straight straw. First, place on the ground or floor at least five pieces of baling rope, each with an eye knot at one end and of sufficient length to go around the bale. These ropes should be laid parallel and about 12 inches or less apart. Across these ropes place a thin layer of straight flag, tule, or long straw. Upon this heap a lot of common fresh, damp straw about 2 inches thick. Upon this straw lay the trees, with the roots all toward one end, and if the fig trees are not very large place some of the smaller trees with the roots more toward the center, in order to make the bundle more cylindrical and less conical. Cover the trees with a thick layer of straw, then bring the straw and flag together to the top of the bundle over its sides and rapidly pass the ends of the ropes together, so that each rope forms a slipknot around the bundle. It takes two men to make such a tree bundle, though it may be made by one man if he is skillful and if the bundle is not too large. The ropes should be drawn as tight as possible. Nurserymen use several mechanical appliances for making these bundles. None, however, have impressed the writer as being very practicable. After all the ropes have been thoroughly tightened, two ropes should be run lengthwise, connecting the cross ropes with one another so that they may not slip off. Finally, the straw and flags protruding unevenly are trimmed off with a sharp knife. The bundles are dampened by water if the weather is warm and dry. Such bundles, if solid, will stand a voyage of a week or two in winter time in moderate climates, but in cold weather they are liable to be frosted. It is hardly necessary to add that the bundles should be kept shaded as much as possible and not exposed to wind or sun.

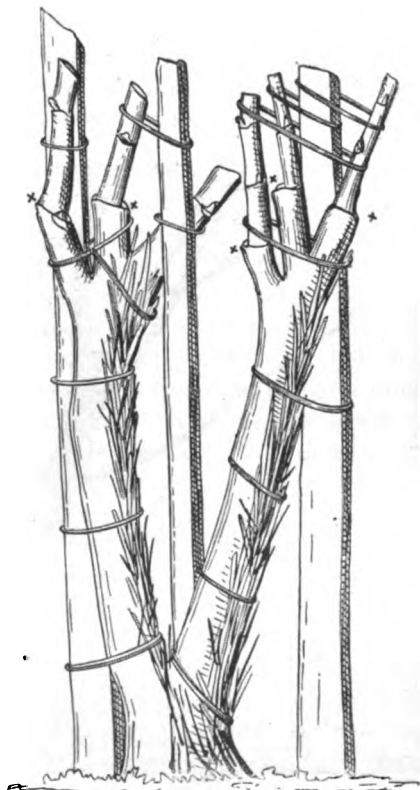


FIG. 27.—A fig tree second year from grafting. The scions have just been cut back and have been tied to the supports in order to prevent breaking from the main stem. The trunk of the tree is covered with straw.

For longer distances moss should be used freely between the roots, or, if the trees are very valuable and the distance long, damp moss may be tied around the roots of each tree separately and the trees either baled or packed in tight boxes. It is a good plan to first dip or puddle the roots of the trees in a wet mixture of clay and cow dung, thus covering the roots with a crust, which will add greatly to their protection and prevent mold or rot from setting in from the outside. The main point in packing is to exclude air. Pack damp, but not wet, and so securely that the trees and cuttings can not shake or change place. Straw is always less valuable than moss for packing, as it brings mold and rot, while moss keeps fresh and alive, even under very adverse circumstances.

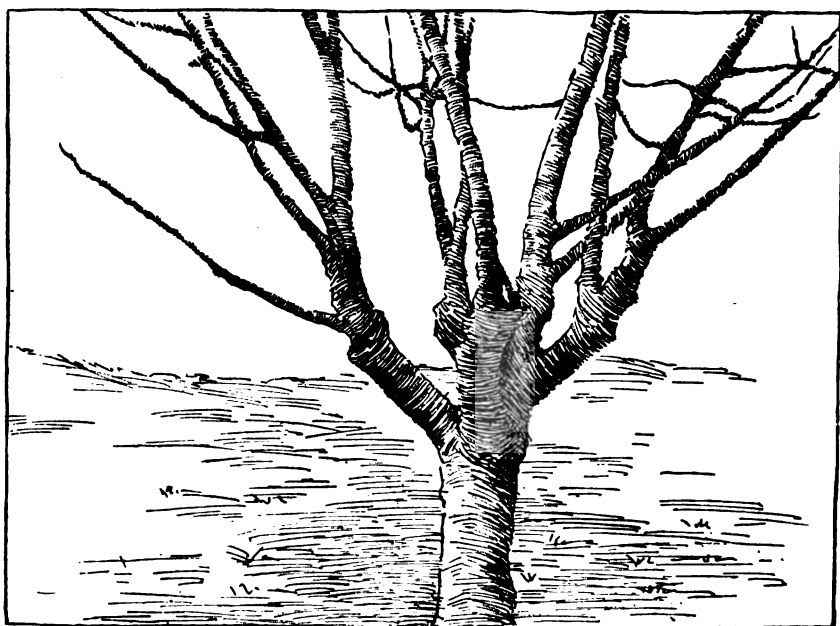


FIG. 28.—A grafted fig tree, three years from grafting.

HOW TO TREAT INJURED FIG CUTTINGS.

Valuable fig cuttings which, through poor packing or by accident, have become very dry may be saved by extra care. Such cuttings, even if apparently dead, should not be thrown away. The process described here for restoring fig cuttings has been tried by the writer several times with complete success. Slightly modified, it may be applied also to almost any other variety of cuttings, such as olives, etc.; but the success is never as great as with figs. Procure a deep earthenware dish and fill with as hot water as the hands can possibly bear and immerse the cuttings completely. Cover over with sacks or blankets in order to retain the heat. If in two hours the cuttings

show no marked improvement, renew the water and make it as hot as before. But if an improvement is seen, renew with somewhat cooler water. The cuttings should remain immersed for twelve hours or overnight, after which drain off the water, rinse the cuttings, and transfer them to a box. Fill the box and pack as tightly as possible with moist sand. The box should then be placed in a hole in the ground and covered at least 2 feet deep with fresh soil. In twenty-four hours the cuttings may be taken out. If there was any life left in the cuttings they will now have sufficiently recovered to be planted. If they yet remain dry there is but little hope, though if very valuable they may again be transferred to water as before and given another trial. The writer has in this way revived cuttings which were pronounced dead and which when cut did not show any sign of sap. Such revived cuttings must be planted and cared for in an entirely different way from other cuttings. They should never be planted in the open ground, at least not at once, but must first be started under glass in a low frame placed directly on the ground. The frame should be slanting toward the north and covered with thickly whitewashed glass. The soil should be very sandy, and a layer of pure sand should be placed over the soil in such a way that when planted the bottom end of the cuttings will rest in the sand, but immediately over the soil. Only living wood must be planted. As soon as the cuttings are planted with only their tips protruding over the sand, the frame may be well watered once and then covered. After that no more watering is required, as a single additional watering may prove fatal to all the cuttings, until they have started and grown several inches. The glass should not be lifted, and no extra air is required until green leaves begin to show. The main point is to keep the frame cool and as dry as possible without allowing the cuttings to suffer. As a rule, even in very warm and dry weather, the frame will retain its first moisture for a month or more. The least excess of moisture will cause the cuttings to rot. Of course the young plants can not be removed until the next season. It is of very great importance that no dead wood should be left and planted, and such cuttings only should be used which show a flow of sap, and even if the sap be faint and watery the cuttings should be planted. The sap will in a few days become milky if the cuttings grow. If dead wood is planted it will draw upon the sap supply and finally rot, even if the eye has started and made a shoot. Such cuttings should, if possible, be cut to a joint. In watering such cuttings care should be taken in using only very pure water from wells or springs, as ditch water is likely to produce rot or other fungus growth in the bed.

SEEDLINGS.

Figs may be grown readily from perfect seeds; but, as only caprifigged figs, or figs which have grown close to caprifigs or to figs with

male flowers, have fertile seeds, it is necessary to use seeds of imported Smyrna figs or seeds from figs caprificated in this country or elsewhere. Cut open the figs and remove all the pulp by washing out in warm water. Seeds which float are empty and worthless, while those which sink are generally fertile. Sow the fertile seeds in shallow boxes containing sand and loam mixed and place the boxes in a frame under glass or canvas. The proper time for this operation is in the spring. In three weeks the seedlings will appear above the ground, and from that time on they must be sparingly watered. The next season they should be set out in nursery rows, the rows 10 inches wide and 4 feet apart. In three years such plants will be found to bear, but they will not necessarily mature the fruit. Very few, indeed, of these seedlings will produce valuable fruit. The majority will give fruits with male flowers, which are always a drawback to the edible qualities of the fig, as they and their part of the fig receptacle never soften. The raising of figs from seed is an interesting process, and by chance some valuable figs may be produced in this way. But, as there are several hundred fig varieties known, it is better first to experiment with them rather than to try to raise new varieties. Unfortunately for the grower, fig seedlings will mostly revert to the wild fig or caprifig, which, of course, always is the male parent. It is not proven with certainty that more than one or two fig varieties of value have been produced from seed, though it is probable that a majority of our fig varieties have originated in this way. According to observations made in Italy as well as here, it seems that fig seedlings produce both regular caprifigs and figs with mixed male and other flowers. Smyrna-fig seedlings raised by the writer produced trees with purely female flowers and others which contained male flowers in various proportions and development. The experiments made by other horticulturists turned out in the same way. So far no edible variety of the common fig has been originated in California, and any statements of valuable varieties having been raised from seed in hothouses in England or elsewhere in Europe should be accepted with doubt.

While it may be unnecessary at present to raise seedlings from edible varieties in order to produce other edible kinds, it is not only not unnecessary, but highly desirable, that we should raise new varieties of caprifigs from seed of caprifigs. In this way we may procure new caprifig varieties which will be more suited to local conditions than any which we can import from abroad. The figs which we have named, respectively, Mitchell and Maslin are undoubtedly such chance seedlings which may prove of much value.

CHAPTER VII.

PLANTING A FIG ORCHARD.

GENERAL REMARKS.

The planting of an orchard includes several different operations, such as preparing the ground, setting the stakes, digging the holes, and setting the trees, as well as their care immediately after planting. As all these processes are of importance and should be intelligently performed, they will be considered separately.

Opinions differ in regard to these operations more than in any others pertaining to fig culture, and the respective horticulturists use different means by which the same object is more or less speedily and properly attained. Most of these methods employed in planting a fig orchard are equally applicable to the planting of any other fruit trees. Still, the fig tree possesses peculiarities which must be considered and humored in order to attain success as speedily and practically as possible. These peculiarities of the fig consist principally in growth and habit, in mode of bearing, in aptness to break down, in susceptibility to heat and dry winds, etc. In this respect the fig tree stands almost isolated among fruit trees and shade trees. One theory holds that the fig tree should be treated very much like a wild tree, and that, because in many places in the Old World fig trees are allowed to take care of themselves and to grow as they please in odd corners, they should receive no serious attention—especially so the caprifig tree, which should be left to nature as much as possible. Like so many other trees, the fig tree may be planted almost anywhere and in any way and still give fruit; but, in order to insure the greatest success as much care should be given the fig tree as to any other fine variety of fruit.

The tree which comes nearest to the fig as regards horticultural peculiarities and wants is undoubtedly the olive, though it differs widely from the fig in many respects; but in planting and care these two trees require very much the same treatment.

DISTANCES FOR FIG TREES.

Of all our fruit trees the edible fig tree requires the greatest amount of space in the orchard. Much, however, depends upon the variety grown. Small-growing kinds like the Brunswick, the Ischias, Mar

seillaise, and a host of others will thrive with 25 to 30 feet between the trees, while others like the Mission, the Adriatic, and the Smyrnas require 50 or 60 feet, the latter being the distance now generally adopted in Smyrna. Where smaller crops are grown between the trees, the larger distance may be given at once, as it will allow ample room for intermediate plantations for years. But where no such crops are contemplated the trees may be set at first 25 feet each way, with the intention to ultimately remove every other tree in each alternate row, while every other row must be removed entirely. But this leads of necessity to great waste of trees, as two-thirds of them will have to be removed in order that the remainder may be 50 feet apart. In selecting the distance we must be guided by the variety, not alone in respect to growth and size, but perhaps principally by the quality of the fruit. It frequently occurs that fig trees while comparatively young give most excellent and sweet fruit, while a few years later the fruit sours and spoils as soon as fairly ripe. This to a great extent is caused by the crowding of the trees, by too much moisture, by want of air and sunshine and room to breathe. Different varieties act very differently in this respect. Thus our Black Mission fig will stand crowding quite well without souring its fruit, while the figs of the Adriatic will inevitably spoil as soon as the trees begin to shade one another sufficiently to keep out the wind and the sun. Thus the Adriatic figs and similar varieties must have plenty of sun and air, sunshine and air being especially necessary to the Adriatic figs. When exposed to constant breezes they can stand some shade without injury. In close plantings with a view to the ultimate removal of the superfluous trees, it must be remembered that by the time the majority has been removed the remaining trees will not have attained the size they would if given the proper distance at first. In places, therefore, where intermediate crops will prove profitable it will be preferable to give the trees the benefit of the greater distance at the first planting. Thus the largest-growing varieties should be given 50 to 60 feet, smaller or medium size 40 feet, and the smallest varieties 25 feet or even less, the Brunswick and Brown Turkey, for instance, being varieties which would thrive as long as they last with a distance of 20 feet.

The above refers only to fig plantations in districts where the trees attain their fullest development, such as in California, Arizona, in some of the Southern States, and in northern Mexico, etc. For localities where the fig tree can be raised only under difficulties no general rule can be given. For further information reference must be had to the respective places in this treatise where the various fig districts are discussed. The relative growth of the different varieties of figs is mentioned as far as known in the general catalogue of figs, and by consulting it some ideas can be formed of the distances to be given in the orchard.

DISTANCES FOR CAPRIFIGS.

The caprifig should always be planted closer than the edible figs. Ten or twelve feet apart each way is suitable, or the trees may be planted in the form of hedges around the main fig orchard. The most economical way is to crowd the caprifig trees into waste and otherwise worthless places where no plowing is required or need be done. The caprifig should be grown "wild." It should never be pruned, and had best be grown as a "thicket." The caprifig wasps require shade.

CARE OF FIG TREES BEFORE PLANTING.

Perhaps none of the operations pertaining to the planting of a fig orchard is of so much importance as the handling and care of the fig trees before they are set. A fig tree after it is dug up and before it is reset is more tender than almost any other kind of fruit tree, except the olive and the citrus trees. As a general thing it must be borne in mind that when once the roots of a fig tree have become injured by drying or sweating they had better be cut off and the remainder of the tree treated as a cutting. A cutting will always grow better than a fig tree with injured roots. The planter should therefore satisfy himself when he buys trees that these have had the proper care, and that they have not been exposed to sun and wind for more than five minutes. This can be prevented easily by covering the fig trees in the field with sacking or blankets, which should be kept wet or damp. As soon as the trees have been received from the nursery they should be heeled in, and care should be taken that the soil is moist, as dry soil will quickly kill the trees. It is always advisable to heel in the trees close to a ditch, or close to water, and if a ditch or reservoir is handy the tree bundles should be immersed before the ropes are cut and the bundles opened. The trees can profitably rest in the water overnight if necessary. In heeling in all ropes should be cut and the trees spread in the trench in such a way that the soil thrown in will surround all the roots, not leaving passages for the wind, or perhaps sun, to enter and dry the trees. Even if the intention is to plant in a few days this mode of heeling in should be followed. Heeled-in trees should be watered and the soil kept firm. If planting is delayed and the trees have become somewhat dry, which can best be ascertained by examining the end buds, the trees should be at once taken out, immersed in water for six or twelve hours, and heeled in very slanting and deep and covered with soil to near the tops; but care should be taken not to cover the tops entirely, as this may cause the trees to rot and will prevent examination of the buds.

If fig trees show signs of starting they may be kept back by exposing to the wind for a few minutes in the shade and again heeled in. This operation, if performed properly, is not dangerous and is quite effective, but it should not be done except in emergency, as the trees will of course suffer to some extent.

PREPARING THE SOIL.

The preparation of the ground for the future fig orchard differs in nothing from the most approved methods used for ordinary orchard lands. The more thoroughly the ground is prepared the less will be the cost of driving stakes, digging holes, and setting the trees, as well as the final irrigation in dry localities. When irrigation is necessary the work on the ground begins with leveling the land. It will greatly cheapen after-culture if this leveling is carefully done. In order to ascertain that this has been done there is no better test than to irrigate the ground before the trees are planted. The soft places will then settle and may be filled in again. Even if irrigation in furrows is contemplated, the surface should be level enough for flooding, in order to insure an equal quantity of water to every tree and to save water and economize labor. After the trees are planted no leveling of the soil can be properly done. Ten dollars more per acre spent in leveling before planting will save perhaps \$10 to \$20 yearly afterwards, besides insuring an even growth to all the trees. In places where no irrigation is needed some attention should still be given to the preparation of the surface, both to prevent stagnant water during the rainy season and to cheapen and facilitate the yearly working of the soil.

After leveling is done the plowing should begin as soon as the surface is properly dry. On no account attempt to plow when too wet or when too dry. The dry soil when turned under is liable to come in direct contact with the roots of the trees and cause them to dry out. The soil when turned over should break up finely, neither forming dry clods nor wet cakes. The soil when turned up must be moist, and the soil immediately below the plow should be yet moister, but not soggy.

In plowing, the team should not be made to go all around the field, plowing toward the center, as this will leave two streaks of hard soil diagonally across the field in the shape of a Greek cross. The proper way is to plow the field in separate lands, from one boundary line to the other, making the turning always in the road which surrounds the land or field, and not in the land. In this way no hard soil will be left unplowed, and when the plowing is over the whole ground will be found plowed in parallel furrows. The harrowing should be done in the same way, but in the opposite direction, and the turning should be made on the land. Two or three harrowings will not be too much, as the more the surface is harrowed and pulverized the better will its condition be for receiving the trees and the cheaper will be the final operations of the planting.

In districts where the fig flourishes most and gives the best fruit no irrigation is needed, and consequently the surface of the ground does not need to be level. Still it is of great importance that it should be sufficiently level to shed all water that may come by rain or flood.

the field, on the boundary of the orchard, or at least parallel to the boundary. By referring to the diagram (fig. 29) we should begin at A and set the stakes to B. This line should coincide with the first row of trees nearest the road. Then go back to A and set another row of stakes to C, this point being the extremity of the field in that direction. This row A-C should be at right angles with A-B if possible; if not, it should be parallel to the road at the end of the orchard. A small level, combined with a compass, is the best and simplest instrument to aid in laying out an orchard. Even without the level the correct lines may be laid out, but this requires a little more labor. After the point C has been found, begin at C and set a line of stakes, C-D, parallel to A-B. For this purpose the compass on a tripod should be used in order to get the point D at least approximately correct. The next work is to go back to B and set the line B-D parallel

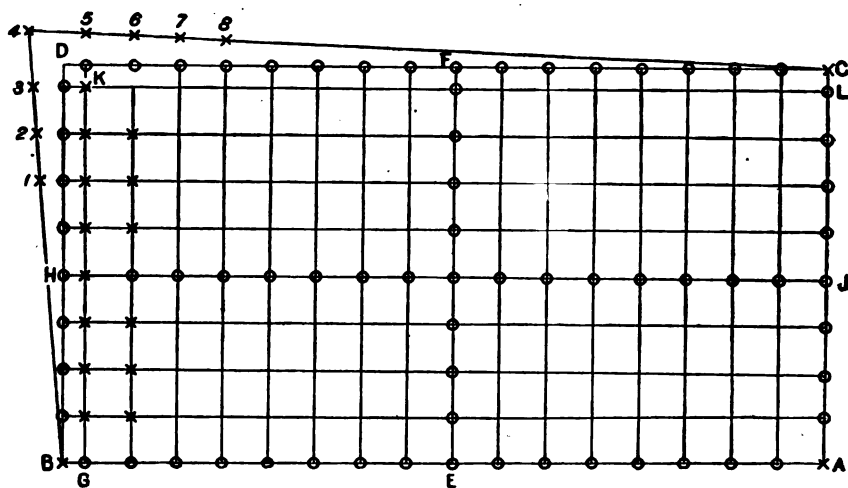


FIG. 29.—Diagram illustrating a farmer's method of laying out a fig orchard.

to A-C. The point D is the only difficult point to set, and upon the correct location of this point depends the lining of the trees. After the point D is approximately fixed, it is necessary to measure from B to D in order to ascertain if the distance is the same as from A to C, and similarly to measure from C to D to see if this distance is the same as that from A to B. If both the lines B-D and C-D are longer than parallels A-C and A-B, respectively, then the point D must be moved toward the center of the field, but if the above lines are shorter than these respective parallels, then the point D must be moved away from the center of the field. If B-D is shorter than A-C at the same time that C-D is longer than A-B, then the point D must be moved toward C. If, on the contrary, C-D is shorter than A-B at the same time that B-D is longer than A-C, then the point D is to be moved toward B. As the whole orchard depends upon this point D, it will

it takes at least two men—one to sight and one to drive and carry the laths. The sighter stands at one end of the line or row while the driver begins his work at the farther end. The driver holds first the lath perpendicularly over the mark on the cable, if there is one, and the sighter makes a sign with his hand indicating whether the lath is to be moved to the left or to the right, and when in line with the farther lath the sighter makes a sign of approval. The driver always works toward the sighter, not from him.

Number of trees or plants on an acre at given distances apart.

Distance.	Square method.	Equilateral-triangle method.
1 foot apart each way.....	43,560	50,300
2 feet apart each way.....	10,890	12,575
3 feet apart each way.....	4,840	5,839
4 feet apart each way.....	2,722	3,130
5 feet apart each way.....	1,742	2,011
6 feet apart each way.....	1,210	1,397
7 feet apart each way.....	807	923
8 feet apart each way.....	680	785
9 feet apart each way.....	537	620
10 feet apart each way.....	435	502
12 feet apart each way.....	302	343
14 feet apart each way.....	222	256
15 feet apart each way.....	193	222
16 feet apart each way.....	170	195
18 feet apart each way.....	134	154
20 feet apart each way.....	108	125
22 feet apart each way.....	90	104
24 feet apart each way.....	75	86
25 feet apart each way.....	69	79
30 feet apart each way.....	48	55
35 feet apart each way.....	35	40
40 feet apart each way.....	27	31

Rule.—Square method.—Multiply the distance in feet between the rows by the distance the plants are apart in the rows, and the product will be the number of square feet for each plant or hill, which, divided into the number of feet in an acre (43,560), will give the number of plants or trees to the acre.

Rule.—Equilateral-triangle method.—Divide the number required to the acre "square method" by the decimal 0.866. The result will be the number of plants required to the acre by this method.

DIGGING THE HOLES.

The stakes which have been set with so much care ought not be disturbed until all the trees in one field have been planted. Before digging the holes, the field should be gone over carefully in order to ascertain if all the stakes are in line. When all stakes or laths line in every direction without deviating an inch anywhere, the field is ready for the diggers.

If the orchard is of any considerable size, a digger should be made to keep his row and put his mark on the end lath, in order that it may be readily ascertained who dug the row. Whether done by contract or by the day, this is a useful practice, the diggers soon learning to be careful. The first move is to give the stake a sharp stroke with

a flat face of the spade in order to drive it solidly in the soil. The hole is next dug on the side of the stake, close to the narrow edge of the lath. If, for instance, the first hole is dug on the east side of the lath, every succeeding hole must similarly be dug on the east side of every lath, otherwise the holes will not line with one another. As to the size of the holes, no general rule can be followed. The hole should never be larger than necessary to admit all the roots in their proper position. As far as the experience of the writer goes, a hole 18 inches deep by 2 feet wide will answer in most cases for all trees, as few trees from the nursery will have more spreading roots than this. However, the proper way is to first ascertain the length of the roots, both horizontally and vertically, and then dig the holes accordingly. A square hole is better than a round hole, as it enables the planter to so turn the tree that any extra long root may be spread out in the angles of the hole. In irrigation districts the hole does not need to be larger than to admit the roots. Actual experiments have proven that larger holes are not needed. Trees planted in very large holes, 4 feet square, did not grow better than trees set in holes of just sufficient size to admit the roots. In fact the shallow hole is better, because with subsequent irrigation the soil in the larger hole sinks or settles, causing the tree to stand too low. Irrigation softens the soil sufficiently to enable even the smallest rootlets to easily penetrate the soil.

In districts where no irrigation is required the hole may be made deeper in order to give soft soil to the lower roots, but in no case does it need to be wider than the spread of the roots. In such localities it is desirable to cause the roots to go down, but not to spread on the surface.

In digging, the top soil should be put in a small pile separate from the bottom soil. The latter had better be scattered at once over the field, as it is desirable to use only top soil in filling in around the roots. The bottom of the hole should not be tapering or funnel-shaped, but square and flat. Few trees indeed have taproots. A funnel-shaped hole will also cause all the heavy ground or clods to collect in the center, where it is greatly in the way in planting trees. The soil in the bottom of the hole should be stirred, in order to prevent it from drying out before the tree is planted.

PLANTING THE TREES.

The sooner planting is done after the holes are dug the better it is for the trees. The habit of digging holes weeks or months before planting is to be greatly condemned, as it causes the holes to dry out and become lined with a crust of dry and hard soil, which must be removed before the trees are set. The first operation in planting is to examine the trees in order to ascertain if the buds, wood, or rootlets are shriveling. Whether this be the case or not it is of great advantage to immerse

the fig trees in running water, or at least in fresh water, overnight, previous to planting the following day. If the stem and buds are plump the trees may, however, be planted at once. Previously to planting, the roots should be trimmed with a pair of very sharp shears. The large roots should be cut back until they show the milky sap freely, all moldy parts should be cut off, and all rootlets which give the least suspicion of being dry, or which do not show sap freely, should be taken off entirely. It is better to plant a fig tree without any roots than to plant it with dry roots, as in the latter case the tree will die back to the ground. In bringing the trees to the field they should be wrapped in wet sacking or blankets. One man should carry the bundles and distribute the trees for about four planters, going but one or two rows, but better only one row, ahead of them, sticking a tree in each hole in such a way that as little sun as possible will strike the roots. If the sun is very warm and the wind blowing it is necessary to have one distributor for each planter, as the success of the planting depends absolutely upon planting fig trees with moist roots. In some cases it may be necessary even to carry a tank of water in the field and dip the fig roots before planting. In moist and cloudy weather no such extra precautions are necessary. It must be always remembered that it is cheaper to be extra careful in the first planting than to replant the following season. Few trees are as tender as fig trees, but with proper care no appreciable loss is necessary.

The mode of planting is to first fill in sufficiently with the top soil to form a small hill in the center of the hole. When placed upon it the fig tree should stand as deep in the hole as it stood in the ground in the nursery. The discoloration of the collar of the tree will show the former soil surface. The roots are then spread out and the tree turned so as to allow the longer roots to spread naturally in the angles of the hole. By means of the guiding lath the trees are all placed the same distance from the laths at the edge of the holes, and if this is done with precision the trees when planted will all be in exact line.

The roots are then filled around with fresh surface soil taken from the vicinity of the tree. If the ground is in proper condition the soil will be found moist an inch or two below the surface. This soil is used for filling. The soil is not to be shoved down by the spadeful on the roots, but gently shaken in by means of light jerks of the shovel or spade. It requires two men to plant—one to hold the tree in place and arrange the soil about the roots by means of a short stick, and one to shovel the soil and do the final tamping. In small plantings the distributor of the trees may be dispensed with and the trees in their wraps may be carried by the man who does not carry the shovel.

The soil should be tramped as hard around the roots as possible; the whole weight of the body as well as force should be applied on the soil. The hole should be filled in level with the surface, and in very rainy weather may be heaped, so as to cause the water to run off.

After the hole is nearly filled some loose soil should be thrown on top, in order to serve as a mulch. In very dry seasons the trees may be set a little lower than the ground and a small basin left around the trunk. The advantages of this system are many. It insures correctness in lining the trees, as the positions of the laths indicate the exact places of the trees before planting; it obviates the filling in and redigging of holes if dug in the wrong place; it makes the pulling out and resetting of trees unnecessary; it is a quicker and simpler method than the old one of using the guide board with one peg on each side of the hole, and, finally, it is a cheaper method than any other in use which insures absolute accuracy.

PLANTING CUTTINGS IN THE ORCHARD.

The planting of cuttings directly in the orchard differs but little from planting the trees. The same method should be followed, but the holes should be deep enough to suit a very large cutting. Such cuttings are the best to plant out, as they are more able than small cuttings to care for themselves. The cuttings should be allowed to protrude only a few inches above the soil, and in times of very dry and warm weather even the top may be covered with a small amount of soil to prevent drying out.

PLANTING TO AVOID SPLITTING THE TRUNK.

The fig tree is more liable to split than any other of our fruit trees. Pruning may greatly obviate this evil, but a much better way and, in the opinion of the writer, the only proper way to prevent fig trees splitting is to plant two cuttings in the same hole, the cuttings crossing each other in the center of the hole. This method has been employed in Smyrna for this reason, and also in France, with a slightly different object in view. The effect of such planting may be seen at once, as the only branches that split off from a fig tree are those which are too heavy for the tenacity of the wood. While the branches never break off entirely, they split from the main stem and always injure the tree, and often ruin it.

The more upright the fig trunk, the greater the pressure of the limbs and the more readily will they split off. The less horizontal and the more downward sloping the branch, the less it is apt to split away from the trunk. By setting two trees or two cuttings in one hole, with the tops a short distance apart, the two trees or trunks resulting from them will lean outward, away from each other, and so will all their branches. The effect will be that none of them will ever split away. In course of time the two trees will grow together at the base and form one large tree of the same form as that possessed by a wild fig tree, which is after all the most suitable shape that can be given a fig tree. In planting in this manner the tree or cuttings should be

made to cross each other in the hole a little below the soil. This will give a greater inclination to the main trunks, which is just what is desired. In training such trees after planting very little labor is required. The trunks will bend out by themselves, and the branches of each tree will complement one another and form one uniform head or crown. No pruning is necessary, except to cut out some branches which grow too closely together. The interior branches will be comparatively very few, and the principal limbs will grow outward. Such trees require less pruning than those planted in the regular or orthodox way, as they will shape and care for themselves. This mode of planting should be adopted for all fig orchards. Fig trees destined to give shade in avenues and ornamental grounds may, however, be set singly.

CARE OF TREES AFTER PLANTING.

Whether the recently set fig trees should be irrigated or not must depend upon circumstances. If the soil be moist, irrigation should be postponed until necessary. The trees should be inspected every two or three days. When in proper condition the buds and the top branches should be plump and the outside scales of the buds should be full of sap if punctured or broken. If any of them show dryness, water should be applied at once, and if, after irrigation, no improvement is seen within a day, there is no alternative but to cut the trees back to the point where they will bleed freely. If, after being cut back, the tree shows signs of continuing to dry, it should be cut back close to the surface of the soil, in order that a shoot may be encouraged to start up and form a new tree. This cutting back to the ground may prove an heroic measure, but it nearly always has the desired effect of causing new shoots to form below the soil, whereas if a drying tree be allowed to remain unpruned it will generally die. Much complaint is heard from planters about fig trees dying, and many prefer on this account to set out cuttings instead of trees. But if this system of heavy pruning back is adopted at the first sign of drying the loss will be greatly reduced.

If the fig tree has been planted for shade and when it is desirable, if possible, to save the standard, this can often be done by closely covering the tree with sacking and excluding as much wind as possible and all the sun. It is wonderful how a sickly tree will recover if properly shaded and evaporation prevented. This process is applicable also to citrus trees and olives, and indeed to all evergreen trees. By watering or sprinkling the covering morning and evening the evaporation of the sap is considerably retarded. The roots should be kept moist, but not wet, for if too wet they will rot. After every irrigation the soil should be dug up and pulverized around the roots in order to admit the necessary air to the roots, as well as for acting as a mulch. The practice of mulching the trees with fresh yellow straw is to be condemned, as the reflection from the straw causes the

sun to scald the bark of the tree. If straw is used at all it should be in conjunction with a tree protector of some kind—paper, sacking, or stakes, in order that the stem may be properly shaded.

DURATION OF PLANTATION.

The edible fig is known to have become several hundred years old, and it bears full crops for one hundred years or more. It is therefore hardly worth the while to consider the duration of a fig orchard, as it will last for two generations or more, and during this time will give an abundance of fruit. However, after a certain time it may prove of advantage to renew the trees, much depending on the way the trees have been treated and upon the soil in which they have grown. Some varieties will last longer than others and some produce their best fruit before they attain thirty years.

VARIETIES TO PLANT.

As regards varieties little can be said. Too little is known concerning the nature and adaptability of certain varieties to localities. No one should plant extensively until it has been fully ascertained that the variety selected is suited to the locality. In places where there are no experimental orchards it will naturally take some time to find the proper variety. Among common figs there are, however, several varieties which will probably do well in many localities. Such varieties are, for instance, "Le Roi" and "Marseillaise White." Among the true Smyrna varieties none is superior to Lop Ingir, the true fig of commerce. But even this variety is in places superseded by other kinds better suited to local conditions. Whatever variety of Smyrna fig is planted it is of great importance to plant only a single variety, or at least to have enough of every variety to produce a large lot of uniform figs. An orchard of mixed fig varieties is troublesome and unprofitable. As the figs must be picked up all over the orchard from under the trees as soon as they drop to the ground it is impracticable to keep the varieties apart if there be more than one kind of fig. Where the varieties are mixed grafting will be necessary, and this will put back the trees and the crop from three to four years after the error in planting has been discovered. Of caprifigs as many varieties as possible should be set out in order to have a succession of figs. When it has been once established which variety is best suited to a certain locality, one or two varieties may suffice. The caprifig trees should be set by themselves in sheltered corners of the orchard. There is needed about one caprifig tree to every ten Smyrna fig trees.

CULTIVATION.

The cultivation of the fig orchard requires no implements which are not also useful in any other orchard. On the Pacific coast the orchards are now almost exclusively worked with horse power. In

orchard culture riding two-horse sulky plows are generally used. Such plows have one or two shares or shovels, and are so adjustable that the shovels may be thrown close to the trunks of the trees. This can only be done while the trees are young, or where they are raised to medium standard high. In the smaller orchards smaller cultivators are used, the driver walking behind. Except in a few places so situated that horses can not be used to advantage, all the work done in our orchards and nurseries is done with plows and cultivators for two and four horses.

In the cultivation of the ground we should remember that the better the soil is cultivated the better will be the fruit. The first plowing should be done in the fall, immediately after the first rains, or in early spring. If the plowing is delayed to January, weeds, which by this time will have started everywhere, can be plowed under to advantage. Early plowing will facilitate the absorption of the rains. The plowing begins between the trees, the soil being thrown to the center. It is important that the bark of the trees should never be the least injured by running against it with the singletree. In order to avoid this injury the regular iron couplings may be superseded by couplings made of leather, which will slide smoothly over the bark without bruising it. When the trees become too large even to admit this, the center of the land is plowed with a sulky plow while the outside of the land nearer the trees is finished with a single plow. One single plowing is generally enough each year. Still one or more plowings afterwards may benefit the soil. There is no danger in cutting the roots of the trees, the cutting of surface roots being beneficial rather than otherwise, as it causes the roots of the tree to strike downward. Many orchardists follow the first plowing with a harrow. This is required only in places where the soil breaks up in clods. Where the soils turns up soft and mellow it is necessary only to follow the plowing with cultivation. The cultivator should be run both lengthwise and crosswise through the orchard after every heavy spring rain or after every irrigation, if such is practiced. The soil should never be allowed to bake or form a top crust. If the soil in the orchard is cultivated by a sulky cultivator three times or more during the summer it will not be necessary to plow against the trees at any time, as the soil naturally tends to level itself. But if cultivation is neglected, it is necessary to plow against the trees every other year or every other plowing. It is of the utmost importance that the soil under the trees should be loose and mellow. If hard and lumpy, the figs will be bruised when they fall ripe from the trees. If the soil is loose the figs are not injured by the fall. It may be necessary to plow furrows in the orchard for irrigation. Such furrows should always be as far from the trees as possible, their distance to be regulated according to the age and size of the trees. It may be necessary to use some hand work in the orchard when the trees come in bearing. This work is generally confined to loosening the soil immediately around the trunks

of the trees and raking away the large clods so as to leave as smooth a soil as possible for the figs to drop on.

THE CREATION OF A FIG ORCHARD IN CALIFORNIA.

During the first period of fig raising in California and the other Pacific States—Arizona, Sonora, and Baja California, the latter two situated in Mexico—no special attention was given to the care and creation of a fig orchard. During the second period, when the early immigrants arrived in California and brought with them cuttings of figs from their homes in Italy, Greece, and Spain, some little attention was paid to the cultivation of the fig, especially for the purpose of supplying the market with the fresh fruit. It is only now, during the third period of the fig industry, after the introduction of the *Blastophaga* wasps by the United States Government, that more attention and care is bestowed on the fig. For the reader who desires to have a summary of the operations and processes necessary to create a fig orchard on the Pacific coast the following résumé may be of interest:

The first move is to select the site for the orchard, and upon its proper location depends the future success. The first condition to be considered is the absence of frosts during the spring, when the trees are in active growth. The second condition refers to the nature of the soil, its quality, drainage, facilities for irrigation, etc., points which have already been referred to more or less. Taking it all in all, deep mesa or table-lands are the most suitable to produce first-class figs in quantities that will pay. An atmosphere that is too dry is almost as bad as one that is too moist. Our river-bottom lands are ideal places, provided they are not subject to spring frosts. In such places the mesa lands surrounding the river bottoms are the best. In some localities it is necessary to go to the second mesas or table-lands in order to find the most desirable locality. The land should, if possible, be summer fallowed, in order to take up readily the first rain in the autumn. After the first rain the land should be plowed as deeply as possible, and a final cultivation should be made just before the planting. The deeper the soil is plowed and the more mellow it is, the cheaper will be the planting. After the last cultivation the land should be dragged with a wooden drag made of boards and loaded down with sand bags or stones.

The best time for planting is immediately after the first frost in the fall, or, if there is no frost, after the leaves of the fig trees have fallen. This is in December on the Pacific coast, earlier or later according to the season. The best success is always had from early planting, and in soils where early planting is not practicable it is advisable not to plant figs to any great extent. After the land is dragged, the first step is to stake the ground in the manner described elsewhere. The stakes may be set from 25 to 50 feet apart, according to the object in view. If 25 feet is decided on, it will not be advisable to grow any

intermediate crop, except during the first year or two. If 40 to 50 feet is adopted as the distance, intermediate crops may be grown for many years, until the trees are 10 to 12 years old. In places where the land is very valuable intermediate crops are desirable, otherwise the greater distance is to be recommended at once. The trees or cuttings should be entirely fresh; if not, they should be soaked up in water until they show fresh sap when cut. Generally only one tree is set in each hole, but we have in another place recommended that two trees or two cuttings be planted in the same hole, 6 or more inches apart, in order to prevent splitting of limbs or trunk. If cuttings are set, they should be at once covered with soil in such a manner that the upper surface of the cutting is just below the soil surface, the soil thus forming a small hill around the cutting, which need not be more than 6 inches above the general level of the ground. If trees are set, they should at once be cut back to within a foot of the ground and then covered with soil in the same manner. If the trees are left higher, they should be covered entirely with flag, tule, or straw matting, in order to be protected from sun, wind, or drought generally. If irrigation is practiced, the trees should be irrigated at once, except in case of heavy rain.

The next step is to watch the young trees or cuttings and see that they do not dry out. This watching should be done every three or four days. Uncover the soil and cut the bark; if sap exudes the cutting is all right; if no sap comes out, irrigation is needed at once. In case of trees which show dry tops, these latter should be at once and without hesitation cut back to flowing sap. A pair of shears are just as useful as a knife. With a certain knack in handling the shears the bark is not sufficiently bruised to injure the tree.

After the trees have started and sent out shoots several inches long it is time to take away the soil raised around the tree or cutting. It is not a good idea to cover the cutting with straw or manure, as it contains seeds which will germinate. It is hardly necessary to state that at no time should there be anything growing within 4 feet of the young plant. A space of 6 feet is preferable on each side of the tree.

The number of times the fig should be irrigated varies according to locality and season. The only guide is to observe the terminal bud. If this bud shows a stoppage in growth it is a sign that the tree needs water. After September no more growth is desirable. After heavy irrigations the land should be cultivated, and in no instance should it be allowed to bake around the tree. The weeds in the orchard are kept down either with two-horse cultivators or with underground cut drags. The latter consist simply of a drag or cultivator, furnished with a long horizontal knife several inches wide. This knife runs a few inches below the soil surface and cuts the roots of all weeds in the most effective manner.

As a rule no pruning is required during the first year or two; the trees are allowed to branch from the very ground. Trees that are raised to a standard of 3 or 4 feet, as is generally the rule, even in

the best orchards, are always at a disadvantage. The branches should be low and the trees should be as shady as possible.

After the first year the plowing and cultivation goes on very much as during the first year. The first plowing is done when the weeds in the orchard have attained some little size. This is generally in January. At that time the orchard is plowed in such a manner that the soil is thrown from the trees toward the center of the land. Later on one, two, or three cultivations, with two or four horse teams, are made crosswise and lengthwise to the first plowing. By the end of the season the land will generally be found to be quite level. Next year the first plowing is made crosswise to the plowing of the previous year, and so on. One plowing and three cultivations are generally sufficient each year. The plowing should be as deep as possible and not less than 6 or 8 inches, in order to prevent the formation of roots too near the surface. As regards irrigation the same rule holds good as the first year. The end buds must be watched and be kept growing until September, or until the crop is harvested. No pruning is required except keeping the trees in form, cutting dead wood and crossing branches, as has been described in its proper place.

The caprifig trees are the first which require the attention of the orchardist. In the second year they will bear some caprifigs, and these should then be caprificated. Caprifigs containing *Blastophaga* wasps should be procured from the nurseryman who supplied the trees or from some other grower. The first caprification is done in the spring (probably in the end of March, when the mamme figs from older trees are suspended in the caprifigs), provided they have no insectiferous mamme of their own. The insects soon hatch out and enter the caprifigs of the young trees. If from that time on there is such a succession of the three crops of the caprifigs that these crops overlap each other in a proper manner, no further caprification is necessary, as the *blastophaga* wasps will take care of themselves. But in case there is found to be a considerable lapse between the profichi and the mammoni—first and second crops—then a new caprification of the mammoni will be necessary, and, similarly, if there is a lapse between the mammoni and the mamme, then the latter—the third crop—requires to be caprificated with figs introduced from some other place. In order to have such a succession of crops of caprifigs it is desirable to plant many kinds of caprifigs, as has been already pointed out. It is highly desirable that the cultivator caprify his caprifig trees as soon as they begin to bear, in order to acquaint himself with the nature of the process of caprification. It may be possible that he will have to caprificate his caprifig trees every year as long as he cultivates Smyrna figs, and not only once a year, but several times a year; in fact, once for every crop. But this supposition is an extreme one. If he has a proper number of good varieties of caprifig trees, it is probable that the wasps will take care of themselves, and that there will always be figs ready to use in caprificating the Smyrna varieties.

When the Smyrna varieties come into bearing they are caprified for the first time in June or July by the profichi or first crop of the capriffs. The insectiferous figs are suspended among the branches of the Smyrna figs at an interval of ten days or two weeks. After this has been done no more caprification of the edible figs is necessary that year. A month or more later the figs begin to ripen, and then drop to the ground. The Smyrna figs are never picked from the trees, because when they are fully ripe they fall of their own accord. If they do not fall they are not fully ripe. The figs are picked up every day and placed on trays to dry in the sun. They are turned once or twice and then taken to the warehouse and sheds, where they are dipped and packed.

As regards fertilizing the soil, this practice is not yet in vogue in California fig orchards. Manuring the soil will of course be beneficial in the highest degree in places where the soil is poor. Powdered sheep manure, ground bone, stable manure, and artificial fertilizers will all be used in time. But before everything else lime is most to be recommended, as experience has shown that the best figs are grown on lime soil.

PERIOD OF VEGETATION.

The edible fig (*Ficus carica*) is a deciduous tree, which drops its leaves even in tropical countries where no frost exists. It never becomes an evergreen tree. In temperate climates, where moisture in the soil is overabundant, a very rank growth will be caused, especially with young trees under 4 or 5 years old. This growth, which continues until cool weather, is liable to get frosted, to the great detriment of the tree. But even if not checked by frost, this growth would soon stop by itself and the tree would become semidormant or almost dormant. There are, however, many wild-fig species which are evergreen, especially in the tropics. Others are semievergreen—that is, they preserve a few evergreen leaves at the top after the majority of the leaves have fallen. Other tropical species are doubly deciduous—that is, they drop their leaves twice a year, at the end of the rainy and at the end of the dry season, only to clothe themselves with new foliage after a rest of two to three weeks. The caprifig tree is a deciduous tree.

The fig tree begins to bear well at about the fourth year, but increases its yield rapidly until 12 to 14 years old. After that time the increase is slower, and after thirty or forty years no great increase can be expected. However, different varieties act differently, and there are off years when smaller crops are had. The variation in this respect relates rather to the first crop, or "brebas," than to the second crop, or autumn figs. Undoubtedly the climatic conditions are more changeable in the spring, and thus the change is greater in the early crops than in the later ones. The critical period of the first crop is the time of setting, while of the later crop it is the time of maturity.

CHAPTER VIII.

PRUNING FIGS.

GENERAL REMARKS.

The pruning of the fig tree must be regulated according to the age of the tree, as a young tree just planted must be pruned radically different from one which has been grown in the orchard a year or more. This remark refers only to the fig tree as grown in the semi-tropical regions and not to trees growing in more northern climates. The pruning of the latter will be remarked on under the headings of the districts where they grow. As a general rule the fig tree requires less pruning than does any other fruit tree grown in temperate climates, except possibly some species of nut trees. Neglected cutting back of recently planted trees may be the indirect cause of their dying, while a cutting back of old trees may cause them to be barren or to yield inferior crops for years. Still, a proper pruning for fig trees is necessary, both to young and old trees; but this pruning, although not less important, must be radically different from that accorded to other kinds of fruit. This refers especially to old bearing trees, as young fig trees may be pruned in almost any way without harm.

PRUNING LATELY PLANTED TREES.

All fig trees should be grown in such a manner that the foliage may be high enough above the ground to freely admit air and wind. Upon this depends not only the growth of the fig tree, but also the quality of the fig crop. Six feet to the lower limbs would be a good height to give a fig tree grown for fruit. This height may be given at once or gradually, and the first pruning should be done with the ultimate form in view. Many growers cut their fig trees back after planting to within a foot or so of the ground. This is a safe way, as the more the young trees are pruned back the surer they will grow. But this cutting back has at least one great disadvantage; it causes the side stems—the future standards—to come too close together, causing them to split off from the main trunk when in a few years they shall become sufficiently heavy. There are two ways to avoid this; one is to cut the tree at planting close to the ground and allow three different shoots to form the new standards. This is really the natural habit of the growth of the tree. All wild figs branch at the roots, and the different branches or standards in time grow together at the base,

forming an enormously wide but very short trunk. Trees grown in this way are not apt to split. When fig trees are planted wide apart in the orchard, and for fruit alone, this several-standard system is considered a good one. It differs somewhat from the general custom, but it agrees perfectly with the nature of the tree. How this is best accomplished by planting two cuttings in one hole has been explained.

If a single standard from the soil is desired, the trees should if possible not be cut back at planting lower than 4 feet from the soil, or better yet, allowed to remain at 6 feet from the soil. Side branches should be encouraged at least 1 foot or more apart, in order that the crotches may not come close together. If the planted tree has several good side branches, cut back the top to the uppermost of these branches and cut out other branches, except those left for the main branches for the future head. All the smaller branches may be left to grow and the thinning out postponed to the next year, the object in leaving them being to enable the tree to shade itself as much as possible the first year. The side branches may be cut back if required, this cutting back doing no injury to the young tree. In after years, however, it can not be allowed, except under particular conditions—as, for instance, when it is desirable to balance an ill-shaped tree. This form is not suitable in the orchard.

PRUNING BEARING FIG TREES.

As has already been stated, most fig trees suffer if their branches are cut squarely back. In all old fig-growing countries, even in England, the saying is: "A fig tree cut back will give no good crop." This has also been the experience in California, especially with heavy-growing kinds. The writer has known an instance where large fig trees which were cut back for cuttings did not again bear good figs, and several similar instances have been reported where for ten years the trees did not recover their producing power. After the first year, therefore, the fig trees should only be thinned out. Never cut back the fruit-bearing branches in such a way that the same branch can send out side shoots below the cut. If cutting be necessary in order to shape the tree, cut back to the fork in such a way that the whole branch will be cut off, either to the main trunk of the tree or to a main branch, and let it be remembered that the less heavily the fig tree is pruned the better for the bearing quality of the tree and the better for the quality of the fruit.

When cut off squarely a branch sends out side branches from a number of eyes immediately below the cut and the end of the branch will look somewhat like a brush. These side branches will interfere with one another and with other branches of the tree, and most of them must be cut away the following season in order to shape the tree and to admit air, light, and heat. But if the branch in question be cut off further down close to a fork the remaining branch of the

fork with its terminal bud will lead off the sap and the brush-like formation will not take place. In other words, after a fig tree has been necessarily pruned every branchlet as well as every branch should possess a terminal bud in order that the new branch system may consist of fairly parallel branches. With this point steadily in view the next consideration will be that of pruning bearing trees.

Unlike other fruit trees, the quality and size of the fig is not improved directly by heavy pruning, except in cases where fig trees are grown in pots or against walls. A fig tree with many branches will bear as large and as fine fruit as a fig tree with few branches. Indeed, it will as a rule bear larger and better fruit. The object in pruning is therefore generally not to increase the size and flavor of the fruit. Still, it can not be denied that the proper pruning of old and heavy growing fig trees will improve the quality of the fruit indirectly, though not exactly in the same way as in other fruits.

The fig must be pruned in order to admit light, heat, and air, and to prevent crowding and bad shape and the interference with other crops grown among the trees. If the fig crop is the principal one the latter consideration must be secondary only.

Heavy-growing fig trees, such as Adriatics, etc., produce better and larger figs if pruned; but this pruning must consist in simply cutting off the young year's wood whenever several branches start out too close together from the same limb. Thus in the above variety the young bearing wood should be at least 2 feet long, without side branches. All other twigs may be cut off close to the main branch, but never cut off squarely or simply cut back. Only cut them off close to the mother branch, as the latter will then bear better and larger figs.

The pruning of the fig when grown in the open should be confined to three or four distinct points. The sterile twigs generally found at the base of the main branches should be cut off each year. These twigs are generally bent downward, are slender, and seldom bear fruit. Larger as well as smaller branches which cross one another should be so cut out that no further interference is possible. The center of the tree in thick-growing varieties should be thinned out or cut entirely away in order to admit sun, air, and light. Lower branches too close to the ground should also be cut off close to the main stem or main branches; and finally, if a tree is unevenly balanced the branches on the larger side may be cut back in order to properly balance the tree. But in all these operations all cuts should be made to a fork and the cut branch should never be without a leader. And finally, in any heavy growing and bearing varieties the side branches of the yearling wood may be cut off close to the stem. As to the time of pruning, the best time is when the leaves have fallen and the fig tree is most dormant. Some sap will always flow, but the more dormant the tree the better.

HIGH AND LOW STANDARD.

The final question, whether high or low standards should be given to fig trees, must be entirely dependent upon climatic conditions and other circumstances. In moist ground the figs should have a high standard, in order to admit the necessary air and light, especially so in localities where the souring of the figs is a common evil. On the contrary, in places where moisture is scarce and where the figs may suffer from drought, the low standard should be adopted, with side branches sloping closer to the ground and shading the soil. Consideration should also be had for the variety, and as a general rule it may be said that figs for drying require higher standards than those grown for table only. The high standard may be considered at once when the trees are first set out, as has been already remarked, but a change from low to high standard may be readily accomplished later and gradually, without any great difficulty or injury to the tree. In Smyrna the branches reach the ground within 3 or 4 feet, while from the main root three or more standards start out at sharp angles to the ground.

CHAPTER IX.

IRRIGATION IN FIG CULTURE.

In localities where the rainfall is less than 25 inches during the rainy season irrigation is necessary. The fig tree, unlike most other trees, does not immediately show when it begins to suffer for want of water; at least it does not show it like other deciduous trees by the wilting and drooping of its leaves. In case the grower does not know when to supply water, the figs will be small and dry and be otherwise inferior. As soon as the fig tree begins to suffer from want of sufficient moisture in the soil it stops its growth. The terminal points of the branches will then suddenly cease to send out new leaves, and instead will begin to mature a bud. If this occurs during the growing season it is a certain sign that the moisture has given out. In all localities where the figs can not keep on growing until the fruit matures irrigation must be resorted to. The right amount of irrigation, the time to give it, and the proper way to lead the water on the land must necessarily vary in different localities, and no rules applicable to all conditions can here be given.

It may, however, be stated that the more water that can be given at once the deeper it will sink and the more the natural moisture will be imitated. Frequent irrigation will create surface roots and tend to keep the deeper ground dry. Flooding is not recommended, except in winter, as the winds are liable to overturn the trees; besides, heavy watering in summer or growing time does not imitate the natural rainfall and those other conditions under which the fig tree develops its fruit to the best advantage and greatest perfection. So far as possible all irrigation should be in the winter, when the effect upon the trees will be that of heavy rains only, provided no more water be given than the tree requires. Stagnant water and irrigation ditches do not tend to improve the fruit of the fig, and localities where such water prevails are unsuited to all figs.

There are, however, a number of varieties which require moist ground in order to produce good fruit. This is the case especially with black varieties, which, with few exceptions, require more moisture than white figs. In the catalogue of figs at the end of this book the writer has noted the preference for moist or dry soil for all varieties as far as known.

CHAPTER X.

DISEASES AND INSECT ENEMIES OF THE FIG.

DROPPING OF THE FRUIT.

Two distinct causes may effect the dropping of the figs before they are ripe. The most common of these causes is unfavorable climatic conditions, either in general or in particular, for a certain variety. This climatic defect may consist in any condition that will temporarily check the flow of sap to the figs. Cold nights, cold winds, and light frosts are equally as effective in causing the dropping of the fruit as are excessive dryness and great heat. Want of moisture frequently causes the fruit to drop or to develop poorly and become tasteless, coarse, and unhealthy. In this case moderate irrigation may be the remedy. Many varieties will always drop if raised in an unsuitable climate. In such cases there is no other remedy than to experiment with other varieties which may be suited to the climate. As numerous varieties of figs are originated under the most different conditions of temperature and moisture, there are enough varieties to suit almost every locality which can be at all favorable for fig culture.

In old Roman times the dropping of the figs was a cause for great annoyance, and the practical Cato gave remedies for its prevention, advising thorough working of the ground. As he did not mention caprification, it is probable that the fig varieties he cultivated dropped their figs from climatic causes only.

Another cause for the dropping of the fruit is a peculiar construction of the flowers of the figs. The Smyrna figs, which require pollination in order to produce ripe fruit, will always drop their fruit if not pollinated. Other figs will, for the same cause, drop their second crop, while their "brebas," which contain differently constructed flowers, will mature. It is hardly necessary to add that the latter class may also drop from climatic causes, even when properly pollinated. To ascertain which of these causes effects the dropping an examination of the flowers is necessary. If the flowers are receptive and have been properly pollinated, climatic defects must cause their dropping. If no pollination has taken place, this fact would cause the dropping even under the most favorable circumstances. Common edible figs suffer much less in this respect, as they are influenced principally by climatic conditions, while Smyrna figs are affected by both causes. Strong-growing varieties drop their fruit as readily as weak-growing kinds. There is no variety which holds its own better than the weak-growing Brunswick.

SUNBURN.

One of the commonest causes of diseases in fig trees is sunburn. This happens, however, only with young trees lately planted and before the new leaves and branches are sufficiently developed to shade the trunk of the tree. The effect of sun scald appears first at the collar close to the ground, later higher up, when the whole side of the trunk facing southwest may be found cracked and with peeling bark. This gives access to borers, prevents the proper circulation of sap, and greatly injures the tree in many ways. Sunburnt trees never recover their vigor and will always remain stunted. Sunburn may be prevented in various ways. One, of course, is in pruning the trees low or even allowing them to shoot out directly from the collar below the ground. Such trees are never injured by heat and sun. But if a higher standard be desired some other means are necessary for keeping the trunk shaded and cool. A newspaper tied to the trunk with common cotton yarn is, according to the experience of the writer, the best and cheapest tree protector. The yarn will never cut the tree as heavier rope will and the paper will gradually fall off just at the time when the leaves of the tree are large enough to shade the trunk. Medicated tree protectors should be experimented with before being generally used, as they sometimes contain chemicals strong enough to kill the trees, or at least to injure them more than sun and wind combined.

FROST.

Fig trees are easily frosted, especially when caught by the frost with their sap in full circulation, and while in full leaf.

In northern climates the old trees as well as the young trees are injured by frost, but in warmer regions like California it is the young trees only which occasionally suffer. Young trees may, through unfavorable conditions, be greatly injured by frosts in several successive years, but when at last successfully raised to the age of 4 or 5 years they will generally be hardy enough to withstand heavier frosts even than those which injured them while young. It is therefore unwise to say that such and such variety is not suited to any certain locality simply because it was for several years after planting cut back or down by frosts. This very variety, as has been repeatedly observed, may in the future be perfectly hardy and profitable. In San Joaquin Valley, California, for instance, the Adriatics were generally injured and even killed by frosts when they were first introduced. As the trees grew older no ill effects were visible after equally heavy frosts.

The injury done by frost shows itself in blackened and withering shoots which die back more or less. In severe cases the bark of the tree becomes black and rots, especially on the south side, where the sun strikes the frosted parts first and most. Smaller trees may be

covered with mats or wrapped in straw permanently for the winter, while for continued cold the dwarf trees are even buried in the soil.

After the frost has caused damage to the branches there is no other remedy than to remove all injured parts at once and cut back until the flow of fresh milky sap indicates that healthy parts are reached. It might be necessary to cut back to the main trunk or even to cut the tree to the ground. If this be done in time new suckers will come up from which a new tree can be raised. If the tree is thus greatly injured it should be cut below the collar, the cut covered with grafting wax or pitch, and all the suckers allowed to grow the first year. The next winter these suckers should be covered by mats, straw, etc., in order to protect them. If they also are frosted there is very little hope for the tree. The following spring the strongest sucker is to be nursed into a tree, while the others should be cut and kept cut back severely through the season. The tree may even die to the ground or succumb entirely. The preventive measures are not many and not very effective. Young trees may be defoliated if they show no signs of becoming dormant at the time frost is most to be feared. Defoliation hastens the maturity of the wood, checks the flow of the sap, and renders the tree less liable to be greatly injured by frost. In France smoking is commonly used in northern fig orchards, the smoke being started an hour before sunrise and kept up for an hour after the sun is up. Tar, straw, and damp chips of wood are used to create smoke, which should be started on all sides of the orchard.

FUNGI.

In France the fig plantations suffer greatly from the attacks of a root fungus of the genus *Rhizoctonus*. The roots alone are infected and are destroyed in a very short time, the ultimate effect being to destroy the whole fig tree. This disease spreads rapidly through the orchard and operates before the cultivator is aware even of the presence of the disease. Sulphur has been used with small success. In order to prevent the wholesale destruction of the fig trees it is advisable to plant them alternately with other trees which are not attacked by the disease, such as olives, pomegranates, or grape vines, or to plant the trees so far apart that the roots can not interlace. Intermediate crops are then necessary. Any other remedy than isolation has never been discovered for this fungoid disease.

SOURING OF THE FIGS.

The souring of the figs is directly caused by a fungoid ferment, undoubtedly related to the fungus which causes acute fermentation in other sweet substances, such as wine. A more distinct cause of souring is the want of proper sweetness in the figs, too much water in the soil, or unsuitable soil. Figs which grow in moderately moist ground sour less than those that grow in wet soils. The drier the soil, to a certain point, the sweeter the figs. Very sweet, sirupy figs seldom sour, and certain varieties sour more readily than others under almost

any conditions. To counteract this tendency to souring, the soil should be kept dry, though excessive dryness will also injure the figs. How increased moisture may gradually ruin a fig orchard has been observed several times. The writer once knew of several acres of fig trees which bore excellent and very sweet figs, the variety being the Marseillaise. These few acres were very profitable to the owner, but gradually the vicinity was settled; the soil became more saturated, because of extra irrigation introduced by new settlers, and as the trees grew older their roots struck deeper and more quickly through this added moisture. These figs gradually showed the effect of too much moisture, they became less sweet year after year, and more figs became sour. After the lapse of three years from the time they were in the height of profitable bearing the trees did not pay, and finally all were cut down as useless, except one or two around the house, which even there had become a nuisance on account of the dropping figs, which at last become sour, with only seldom a good or fair one.

Small flies are often seen emerging from sour figs. These flies are, however, not the cause of the souring. They are simply vinegar flies, which, attracted by the sour juices, flock to the fig to there lay their eggs and breed. They never visit healthy figs. The souring of the figs is greatly facilitated by their bursting open. As is well known in our fig districts, many figs burst open in the fall of the year or at the end of the summer. A few days after bursting the figs turn sour and become worthless for drying. The bursting open gives access to the interior of the fig to acetic bacteria, which cause the acid fermentation. As long as the eye was closed bacteria and fungi were kept out, and no fermentation could take place. There is no doubt that the principal function of the eye of the fig is to keep out bacteria and insects, and the closed form of the fig receptacle is undoubtedly effected by nature in order to prevent parasites from spoiling the sugary juice of the fig. Adriatics are especially apt to sour, but so far I have never found a sour fig which had not previously become cracked or split. The cracking open of the figs is due principally to moisture in soil and air. Figs will remain healthy on the trees until the advent of a rain storm or a fog. This increases the moisture in the air, which, again, causes the figs to swell from absorption of moisture. It is this swelling up which causes the figs to burst. Too much irrigation may have the same effect. Against the bursting on account of moisture in the air there is, so far as I can see, no remedy.

SCALE.

The fig tree in California has so far been very free from scale insects. In Europe, however, as well as in the Southern States, the fig trees are frequently attacked by scale. In the Mediterranean region the scale of the fig is the *Chermes caricae*. It was mentioned by Cestoni in 1733, and has been common since that time. It is a large scale, one-

third of an inch long by one-quarter of an inch wide when full grown, oval, convex, and of an ashy-brown color. The young hatch in May, and spread at once over stems, leaves, and even over the fruit. The effect is the stunted growth of the branches, dark spots on leaves and branches, the figs fall off, and in extreme cases the branches, and later the whole tree, succumb. At the end of August the young scales gather on the outside of leaves and branches, and become stationary, where they continue to grow until the following spring, when the young burst the cover of the old scale and proceed as indicated. Probably any one of the scale remedies in common use may be successfully employed as an antidote, but the writer especially recommends the lime, salt, and sulphur compound, the composition of which is as follows:

150 pounds of sulphur.
250 pounds of lime.
100 pounds of salt.
25 gallons of water.

Use a kettle 2½ feet high by 3 feet wide. Put the water first in the kettle and boil the ingredients for eight hours, adding water as necessary. After boiling the prescribed time a mush-like mess is formed, which when put into molds hardens, but dissolves readily in water. Dissolve 5 pounds of this cake in hot water and then add 30 gallons of water. This is used as a spray on the trees in the spring before the scale hatches.

If this scale appears in this country it will probably be fought by the introduction of parasites.

BEETLES.

Small Coleopterous insects or beetles attack the figs in the vicinity of Paris. These insects of two species bore the figs while they are yet rudimentary, and cause great damage to the crop. As a remedy damp moss is placed in the vicinity of the stems of the fig. The beetles collect under the moss and may be removed early every morning. Another remedy consists in sifting ashes over the branches in the early morning while the dew is yet on.

WORMS IN DRIED FIGS.

The small maggots so frequently found in dried figs are not really worms, but larvæ of a small moth. These larvæ feed on the dry figs, as well as on other dry fruits. The eggs of the moth are laid on the fruit after it has dried and the maggots develop in a few weeks. Dipping in hot or boiling water is useful as a remedy; close packing and pressing of the figs will also to some extent prevent the havoc of the moth. A light sulphuring of the figs for a few minutes will probably kill the larvæ. The sulphuring is effected by burning sulphur in a closed chamber or room in which the infected figs have been previously placed. Too long sulphuring would undoubtedly injure the taste of the figs.

CHAPTER XI.

DRYING AND CURING FIGS.

GENERAL REMARKS.

The process of curing figs must necessarily be different in different countries, not only directly on account of climate, but because the figs are of different qualities, large or small, very sweet or watery, thin-skinned or tough, of good drying quality or the opposite. What will be set forth here is the method which has been the most successful in California—successful not because these methods are better than those employed in Smyrna or Portugal, the homes of the best dried figs, but because so far our figs are decidedly different from those grown there. The reasons for this are several. In this country we have tried extensively only a few varieties of figs out of a possible hundred or more. Many more varieties have of late been planted, but the time has been too short to decide which ones have come to stay. The fig territory of the Pacific coast is so large and conditions so different in different localities that at least ten or twenty years must lapse before it will be possible to assign the proper variety to the locality best suited to it. A great obstacle in the way of extended fig culture is the tendency of the growers to despise small or medium-sized figs in their endeavor to imitate the product of Smyrna. It is the medium-sized figs which are the successful ones in all the Mediterranean countries, except in the valley of the Meander. Neither Italy, Spain, France, nor Greece produces large figs for drying, but only small or medium-sized ones. Our fig growers should concentrate their first efforts in producing a merchantable and sweet fig for common use for the middle classes; then large, sweet, and showy figs, consumed in limited quantities by the more wealthy people, will be the necessary outcome. Not every place in our fig districts will be suitable for growing the large varieties, but a thousand places will be found where the medium-sized figs may be grown and cured with profit. The difference in curing different varieties is considerable, but not great. The size does not count as much in this difference as do the inert qualities of the fig—its sweetness and the facility with which it dries. It makes a vast difference whether the figs are picked from the trees or from the ground in perfect condition; whether they have to be sulphured before drying in order to prevent fermentation and to secure better color, or whether they can be dried as soon as gathered.

SIGNS OF MATURITY.

No figs should be picked before perfect and absolute maturity is attained, if the object is to produce a good dried fig. Figs picked before maturity will dry, but they will not be sweet and soft, the two indispensable qualities of a dried fig. It is therefore important that everyone should know when to pick his figs. Not all figs ripen at the same time; in fact, this successive ripening is considerable of an annoyance to the growers, as it necessitates the going over of the orchard several times. During the height of the season every tree must be looked over daily, or if the grower is fortunate enough to possess a variety which drops of itself when perfectly mature, these fallen figs must be picked up every day, because they spoil if exposed more than twenty-four hours on the bare and shaded ground.

A perfectly ripe fig will not only be soft, but wrinkled, and hang down perpendicularly from its branch or twig. Many varieties show additional little white seams or cracks, which always indicate perfect maturity. These seams are especially noticeable around the peduncle or stalk end, but not all varieties show them. The above general signs are common to all figs, and figs suitable for drying should also be sweet or very sweet.

The best Italian and Smyrna figs when dried show 60 per cent of sugar, equal to about 35 per cent before drying. Unlike grapes, figs will not become much sweeter after they have matured. The sugar will be more concentrated, but the quantity will not materially increase. A sign of great excellence in figs is when a drop of very thick sirup is seen hanging from the eye. The fig is then in its prime and can not be improved by hanging any longer. Figs hanging any longer on the trees are exposed to various ferments, acid or otherwise, which as soon as they set in will ruin them. Genuine Smyrna figs when perfectly ripe drop to the ground. They should never be cut from the tree.

OILING THE FIG.

This operation consists in piercing the eye of the fig with a needle dipped in oil or by closing the eye of the fig with a drop of olive oil. This process is of very ancient origin, and must not be confounded with caprification. While the object of caprification is to cause the fruit to set and produce fertile seed, the object of the oiling is to hasten the maturity of the fruit several days. For the practical part of this oiling see article on "France." The physiological effect of the oiling is not explained, and is probably to be found in something else than in the mere exclusion of air.

The origin of the practice is very old. In the Old Testament the prophet Amos (chap. VII, v. 14) speaks of "bôlès schiqmîm," which was translated by Luther as "Who take off the mulberries." But the true translation according to Solms-Laubach is "Who performs an

operation on the fig." Bôlès or balas, however, refers to wild figs. It has been suggested that the expression of Amos refers to caprification, and was so given by De Lagarde. But it is much more probable that "bôlès schiqmim" refers to the process practiced to this day of cutting or piercing the sycamore fig with a knife, in order to cause the Blastophagas to develop quickly and leave the fig.

In Italy the oiling of the fig is called "egliazione." The process was mentioned by Theophrastus as practiced by the ancient Greeks, and Pliny mentions it as one of the practices of the Romans. In modern times oiling is in vogue in Italy, Syria, Spain, and Provence. Even other substances have been or are used, such as alcohol, and (according to Professor Solms-Laubach) Dr. Eîsig was told in Ischia that oil caused "muso chiuso" (mouth shut), but alcohol "muso aperto" (mouth open), indicating that oil would cause the mouth or eye of the fig to close, while alcohol would cause it to open.

It may be interesting to note that unless the sycamore figs are pierced by the knife they are said not to reach perfection nor to be edible. There is reason to believe that there is a twofold object in piercing the sycamore figs: first, to cause the wasps (*Sycophaga sycomori*) to quickly develop and leave; second, to cause the fruit to develop or to hasten its development. If such be the case, the piercing of this fig is at least partly analogous to the puncturing of the edible figs as practiced in Provence.

Oiling and puncturing of second-crop San Pedros will not cause them to develop. The writer has tried it several times without success. According to reliable testimony of French growers the oiling hastens the development and maturity of the figs about six days. It is generally practiced at Argenteuil, near Paris, where the production of "figues fleurs," or first-crop figs, for the Paris market is an extensive industry.

HOW TO ASCERTAIN THE SUGAR PERCENTAGE OR DEGREE IN FIGS.

Figs contain much less water than grapes, and while the latter require only to be squeezed out in order to have their saccharine measured, figs can not be thus treated. There are several ways by which the percentage of sugar may be ascertained, but the simplest one for the fruit grower is as follows: Procure a graduated glass from some firm dealing in chemical apparatus. The graduate should not hold less than a quart. Fill this to the upper graduation with figs, not packed, but loosely shaken in. Then pour on water slowly until this also reaches the top graduation. Then take out all the figs one by one, place in a dish to drain, and add this drained-off water to what is left in the graduate and ascertain to what line this water reaches. The difference between this line and the top line indicates the volume of the figs. Suppose that this is 20 per cent. Next cut the figs into smaller pieces, place in a clean pot, cover well with water, and heat to

the boiling point. At least 40 units of water should be added to the figs if their volume was 20 per cent. After having boiled for a while ascertain, by tasting, if all the sugar is leached out of the figs. If so, remove from the fire. Filter the liquid from the figs and then squeeze the figs in a cloth until as much of the liquid is removed as possible; then add this liquid to the former liquid. If this liquid in which the figs have been boiled measures less than 20 units, more water must be added; but if it measures more than 20 units, or the volume of the figs, it must be evaporated by boiling until it shows exactly 20 per cent. Filter through blotting paper and then weigh with a saccharometer. In order to have first-class dried figs the saccharometer should indicate 35 per cent of sugar. The object of the whole process is to extract the sugar from the figs and to ascertain correctly its percentage in relation to the volume of the figs. This method will only suffice for a rough estimate and not for a chemical analysis. As the commercial value of figs depends principally on the quantity of saccharine they contain, every grower and dealer should be prepared to test the saccharine. Fresh figs used for drying should show not less than 35 per cent, and dried figs not less than 55 per cent of sugar.

GATHERING THE FRUIT.

Figs destined for drying should be carefully handled in order to preserve a fine appearance when offered for sale and also to prevent undue fermentation while curing. In localities where caprification is practiced, little labor is required in picking the figs, because caprificated figs, or varieties which require caprification, fall from the trees when perfectly mature and in prime condition for being dried and cured. The cause of this dropping must be sought for in the perfect condition of seeds and consequent perfection of the fruit, the nature of which is to fall from the tree when sufficiently developed to propagate its kind. Figs which have not been caprificated fall first from the tree when decay has begun to set in in some form or other. Such figs are therefore never as perfect as when cut from the tree at the proper time. If carelessly pulled from the branches the figs will be bruised and torn, the skin around the neck is apt to be injured, and quite frequently the neck itself is torn off, exposing the pulp of the fig to view. Bruised figs will be inferior in many ways. The contents will ooze out, and pulling and fancy packing can not be resorted to. Figs may be twisted from the branch by an expert picker, but even with the best of skill and care many figs will be injured. Besides, the process is too slow. The proper way is to cut the figs from the branch as closely to the tree as possible, leaving no part of the neck and stalk adhering to the branch. A small knife with a fixed blade, such as is used for picking grapes, may be used, but a size smaller is more convenient. A knife 6 inches in length—handle and blade—is of proper size. The knife should be quite sharp, or it will tear the delicate skin of the fig.

For gathering the higher figs a convenient instrument may be made, called the "fig picker." It consists of a forked stick or artificial fork, across which has been tacked a strip of tin plate. Below this is a bag kept open by a wire. (See elsewhere for further description.) With this fig picker the highest figs may be cut without being bruised, but the process is slower than cutting with a knife and should be used only for figs which otherwise could not be reached.

SULPHURING.

Sulphuring is a process by which fresh fruit, immediately before drying, is exposed to the fumes of burning sulphur in a closed chamber called the "sulphur box." The object of sulphuring fruit of any kind, and especially figs, is twofold: First, to prevent fermentation during the process of curing; second, to bleach the fruit. The action of the sulphur fumes is deathly to the microorganisms or fungi which, as is well known, cause the fermentation of various substances containing sugar. The action is also purely chemical, as sulphured fruit assumes a semitransparent and light-yellowish color, the more intense the longer exposed to the fumes. Sulphured figs, as well as sulphured fruit generally, is inferior to fruit which is naturally of light color and unsulphured. Not only is the acid caused by sulphuring easily tasted by anyone with a sensitive taste, but the effect of the acid is purgative, and the use of sulphured fruit for any length of time is injurious, especially if the fruit has been exposed too long to the fumes. The writer is not an advocate of sulphuring generally, and does not advise the sulphuring of figs unless it be found that otherwise they will not dry properly nor assume the light color demanded by the market or the trade. Many fig varieties do not dry well, but ferment, puff up, and become acetic during the process of drying, even when exposed fully to the sun. If sulphured, however, for a few minutes, the germs of the ferment are killed and the curing will proceed without difficulty. This is especially the case with large figs of inferior sweetness. Figs which require no sulphuring are greatly to be preferred to those which do. The true interest of the fig grower is to procure varieties which will dry readily and assume a good, pale, semitransparent color without any chemical manipulation.

Sulphuring, when necessary, should be resorted to as soon as the figs are picked and placed on the trays. The sulphur box is closed and made as air-tight as possible. It should not be over 5 feet high, but wide enough to admit two trays. The trays are placed two deep in the box, and are made to slide on a rack or on cleats nailed to the sides. The door must be made to shut very tight, or the fumes of sulphur will escape. There should be at least 2 feet between the place where the sulphur fumes are originated and the lowest tray. This tray should be dampened, but not contain any figs. The figs are placed on the trays as close as possible, but only one fig deep, and

with the eyes pointing in the same direction. Fill the box with loaded trays, light the sulphur, and then close the door.

The late B. M. Lelong suggested the following method of creating the sulphur fumes: Place a small kerosene stove on the floor of the sulphur house, and on the stove a heavy sheet of iron $1\frac{1}{2}$ inches thick. Light the stove, and when the iron is hot, but not red-hot, extinguish the light and throw the sulphur on the plate. The fumes rapidly fill the house, enter the figs, and kill the ferment, and also act on the skin of the figs. The amount of sulphur to be used varies, but a couple of handfuls are sufficient if the box be tight and the figs not too watery. It takes about five minutes to fill the house with sulphur fumes and six or seven minutes more are required to sulphur the figs. If exposed too long their taste will become too acid and the skin will peel off when the figs are handled. It is preferable to have a little darker color than to have the figs sour. All sulphuring should be done in the morning or before noon. The sulphured figs should be exposed to dry air and sunshine in order to get a good color and as clear a taste as possible. It is unfortunate that the market accepts sulphured figs and that it requires the figs to be excessively light colored.

Some growers sulphur their figs for six hours, and some even leave the trays in the sulphuring box over night. It is deplorable that the market is such as to command the sale of such fruit, which, to the writer at least, is unpalatable in the extreme.

Genuine Smyrna figs never require sulphuring.

It is hardly necessary to add that only light-colored figs should be sulphured. Black figs if sulphured assume a very disagreeable color.

A gentleman who was born in the Smyrna district furnished the writer with the following method of sulphuring, though it is not thought that he practiced the method while there. He recommended one-half sulphur and one-half saltpeter mixed, the fresh figs to be exposed to the fumes of this mixture for fifteen to twenty minutes, then for three days, and afterwards sweated for several weeks. The writer has not seen figs treated thus.

DIPPING WHILE FRESH.

Instead of sulphuring, some growers dip the figs while fresh in boiling water. Common salt water is best, but in lack of it $1\frac{1}{2}$ pounds of salt to 50 gallons of water will answer. First rinse the fresh figs in fresh water, then dip the baskets or buckets in which the figs are placed in the boiling salt water for one second or more, and repeat once or twice. This will soften their skins.

For dipping, Mr. A. Gartenlaub proceeds as follows: First wash the figs in pure water, then dip in a solution of $1\frac{1}{2}$ pounds of saltpeter to 50 gallons of water, the water to be boiling hot. Dip once or twice. This method he claims to be better than the use of salt. The writer has neither seen nor practiced this method.

DRYING ON TRAYS.

The California and Arizona method of drying fruit on trays is by far the most practical as well as the most labor-saving way to handle the fruit during the process of curing. For figs the small trays used for drying raisins are the best, as they are a convenient size and easily handled. In order to save labor in carrying, the drying ground should be outside the orchard and adjoining the sulphur house. No drying can be done in the orchard, as the trees will shade the trays at least during part of the day. The figs require all the sun they can get. The drying ground should be as free from dust as possible. As the figs require repeated turning over while drying, it is most convenient to have the trays elevated above the ground sufficiently to enable the work of turning to be carried on without stooping down. The simplest contrivance is to provide "sawhorses," across which are laid long strips of lumber, 2 by 4 and 2 by 3 inches wide, and as long as convenient. The sawhorses should be 4 feet long, which will admit of two tiers of trays being put across. A man can then easily reach across from either side. The figs are placed on the trays, with the eyes all toward one of the long sides of the trays, and this side should be slightly raised in order to prevent the contents of the figs from running out by gravity. The raising of one side of the trays is easiest accomplished by placing the 2 by 4 strips in the center on the horses, and the 2 by 3 outside. This raises the trays 1 inch, which is generally sufficient for medium sized and not too pulpy figs. By placing an inch board above the scantling, the trays may of course be elevated 1 inch more.

Immediately after sulphuring—whenever sulphuring is absolutely necessary—the trays should be distributed on the racks and exposed to the full rays of the sun. This should be finished before noon every day if it is of importance to have a good color on the figs. Dark figs may be exposed any time of the day, as they are generally more easily handled than the white ones.

TURNING.

In order that the figs may dry evenly, they should at first be turned twice a day, and later once a day. Sulphured figs should be turned twice the first day, because if left overnight without being turned the color will be injured. Black figs need to be turned only once a day if not watery. The turning requires much labor, as it can be done only by hand and by turning each fig separately. No contrivance has as yet been invented by which all the figs may be turned at once, in the same manner as raisins are turned. By placing one tray on top of the other and turning the two together, the figs will become badly disarranged and will require more labor to be straightened than if turned at once by hand separately. Despite sulphuring and careful selection in picking from the trees, some figs will sour during the process of drying, especially if the figs are not very sweet. In

turning, all such figs should be removed and used for vinegar or be thrown away. No pulling or pressing of the figs while turning is necessary, and no one can afford to put too much labor on them. The pulling and flattening is done after dipping and at packing.

The sour or fermenting figs may be easily recognized by their puffed up appearance and by the fermenting froth issuing from the eye. While turning, each fig may be given a slight pressure to ascertain its condition. If fermenting or sour, a wheezing sound is heard or "felt," the fig being watery and frothy in the center. Such sour figs will spoil the value of the box, being disagreeable and nauseous to the taste.

COVERING.

Figs, more than almost any other fruit, are susceptible of being injured by dampness, either in the form of rain or dew. Not only does dampness retard the drying of figs, but it spoils their color, or may even cause them to mold and rot. Rain is especially damaging both to figs on the trees and on the trays. It is therefore necessary to cover the figs not only when rain and fog are threatening, but every evening, as a protection against dew. If rain is expected it is best to stack the trays, placing one tray on top of another in stacks about 5 feet high. Four empty trays are placed on the ground, leaning against the stack, in order to keep off splashes of rain and sand, and the whole stack is then covered with a strip of canvas. In places where the fig industry is permanent, money and labor will be saved in having permanent drying beds made of brick and cement or filled with gravel. As such beds have appliances for quickly running the canvas over the trays, no stacking is necessary. Early at sunrise, or, better yet, half an hour afterwards, the covering should be removed.

WHEN SUFFICIENTLY DRIED.

It is of great importance that the figs should be exposed long enough to become sufficiently dried, but not so long as to be overdried. A fig when sufficiently dried and ready to be removed from the tray should, when slightly pressed between the fingers, be soft and pliable. The contents should be distinctly pulpy, and when pressed should not resume their former position, but remain as pressed. In other words, the pulp or meat should be plastic (not elastic), hard, and dry. If not sufficiently dried the fig will burst at the stalk end if pressed even moderately hard.

Underdried figs will spoil, sour, and mold, and will become useless. Overdried figs will be hard and leathery and tough; will lose their flavor and color, the white ones becoming darker and the black ones turning a dirty brown. The overdried figs may be partly improved by dipping, but the underdried figs can in no way be improved. In order to produce only figs which are properly dried and cured, it will be found absolutely necessary to remove daily all those figs which are properly dry, allowing the remainder to be exposed to sun and air a

longer or shorter time. The time required for drying varies considerably between four and sixteen days, according to size, quality, and sweetness. To allow all the figs to remain on the trays until all are dry will produce a very inferior article. Daily removals are necessary.

SWEATING AND EQUALIZING.

It is less necessary for figs to undergo the sweating or equalizing process than it is for raisins. Still, figs are greatly benefited by being stored and equalized a few weeks before packing. But regardless of the desirability, which, however, is not a necessity, it is practical and labor-saving to house the figs a few days before packing. This is best done by placing them in sweat boxes of the same size as those used for raisins. In storing these boxes it is of importance to prevent fermentation. The boxes should never be placed close together, but at least 4 inches apart, and each tier of boxes should cover the one below in the same way as bricks in a wall; but there should be the space of 4 inches between the boxes. Between the rows of boxes a gangway of 3 feet is necessary, this being sufficient to allow easy access to the rows from each side. The boxes should be examined frequently by running the hand down among the figs, in order to ascertain if any heating is in progress. Heating figs must be at once removed and aired. If there appears to be any general danger that the figs may heat, it is preferable to pile the boxes in stacks, each box being placed crosswise on the one below. In this way the boxes are more readily removed, as they are not bound up in a whole tier of boxes. After a few days the figs will have become equalized as to their moisture, the skin will have softened considerably, and they will have otherwise improved.

DRYING FLOORS.

In places where many figs are to be dried, drying floors will prove a great convenience. Floors similar to those used for drying raisins, or slightly modified to suit the occasion, may be used for figs. On these floors the figs may be dried either by being placed directly on the floor or by placing the trays on the floor. The following directions may prove desirable:

The drying floors are built of brick and slightly elevated. The long sides are as long as required, but the short sides should be about 6 feet 6 inches, interior measure, allowing three trays depth. The back wall is 2 feet high and the front wall 6 inches high. At the bottom there should be a row of holes, to allow rain water to escape. The interior of this bed is filled with pebbles, if they can be had; if not, any gravel, if clean, will answer. Cement and asphaltum, however, are probably more desirable when their expense can be incurred. Along the back of the higher part of the floor should be a row of posts or uprights made of 2 by 4 inch lumber, driven securely in the soil. In the top of each upright is driven an eyelet, through which runs

a stout wire the whole length of the frame. A strip of canvas is used for covering. The canvas must be hemmed and furnished with small rings, by means of which it is attached to the wire of the uprights. In front are similar rings, in order that the canvas may be securely stretched and fastened to small posts set in front, which, however, carry hooks instead of a running wire. In order to make the canvas waterproof it should be painted with at least two coats of linseed oil. Only pure linseed oil should be used, as impure oil cleared or mixed with certain chemicals will rapidly rot the canvas. If the floors are of the above size they will admit of three trays in depth. A pathway of 2 feet should be left between the rows of trays to allow the workmen to kneel while turning the figs. When the canvas cover is not in use it should be rolled up and fastened by straps to the back of the higher posts. In case of rain, and every evening, the canvas is easily unrolled and spread over the figs. Loose strips of lumber may be laid along the pathways to keep the canvas from pressing on the figs.

The above suggestions have been adopted and modified according to the plans of Spanish and Santa Ana raisin floors.

ARTIFICIAL DRYING.

In many districts it is impossible to dry figs in the open air, with the blaze of the sun as the only drier. In such localities evaporators or driers which produce artificial heat from fuel are required. The ideal dryer is not yet invented. There exists a great number of patented driers in the market, most of which are very good. Very large driers are expensive, and the writer prefers having a number of smaller ones, which are easier to manage and which cost less to keep in repair.

DIPPING.

Figs used for artificial drying are generally those grown in moist districts, where the seasons are less favorable to the full development of the fruit and where, consequently, the skin is thicker. Such figs should be dipped before being dried. This dipping is best done in a hot solution of potash or lye made from ashes of grapevine trimmings. The figs are first washed in cold water. This is done by placing them in perforated buckets holding 10 pounds and immersing the buckets in a trough of running water. Immediately afterwards the bucket is transferred to a kettle containing boiling lye, made of 1 pound of potash to 10 gallons of boiling water. The lye should be boiling and the figs suspended in it for 1 minute. No rinsing afterwards is required. The figs are spread on the trays in such a way that they do not touch one another, their eyes all toward the same side and slightly upward. The heat in the drier should never be allowed to run too high, as the best figs are produced by a lower heat of about 45° to 50° C., or about 120° F. The drying requires from thirty to forty hours, and when finished the figs must be pulpy and not rattling. They should be packed while yet warm, without other dipping or addition of sugar.

CHAPTER XII.

PACKING FIGS.

GENERAL REMARKS.

The packing of figs as practiced in different countries is extremely varied, and in each district figs are packed in many different ways, different grades being treated differently. The first grades in Smyrna are packed with extreme care, and no superior or equal packing exists anywhere. This skillful packing should be reserved for the best grades, and in imitating Smyrna we should first of all endeavor to produce quality in the fruit, and later quality in packing. It neither pays to pack inferior fruit in the best possible way, nor is it to advantage to neglect packing and place good fruit on the market in a slovenly way. For medium quality of figs a cheap but attractive packing should be adopted, reserving the greatest care and skill for the very best article. It is futile to believe that the consumer will repeatedly buy a poor article simply because it is packed to imitate the best foreign grade. The deception may succeed once or twice, but it will not create a lasting trade; on the contrary, it will bring the article into disrepute.

In packing, the grower should be guided by his own judgment and by the actual value of the figs. It is proper for him to procure the best imported article in the market, as long as the foreign figs are better than ours, and compare the homemade with the imported. Sweetness is the first important point in figs, and without it color and size do not amount to much. Therefore, if the figs are sweet—58 to 60 per cent of sugar when dried—consider the advisability of packing them extra well. If they are not up to the standard in sweetness it is better to adopt a less expensive method without neglecting taste in arrangement and attractiveness in appearance. A good article, even, will not sell if slovenly packed; or, if it sells, it commands an inferior price. Extra labor on packing good figs will be found very profitable. The Italian and Portuguese figs, though they may be really good, bring only inferior prices, and on account of general carelessness in packing and handling go mostly to the fermenting tanks and coffee mills. The Portuguese fig trade was not long ago superior to that of Smyrna, but neglectful packing ruined the business, or at least helped to ruin it.

There are two distinct modes of packing figs, regardless of the boxes or bags, mats, or drums they may be packed in. One way is

to "pull" the figs and pack them in such a way that the eye of the fig rests in the center, it having been brought there by pulling and manipulating the fig. This we may call the "flat" way, and the figs are called "pulled figs." The other method is to pack the figs just as they grow and come from the tree. This may be called the "square" or "bag" way. In Smyrna the flat figs are called "eleme" (pulled) and the square figs are called "locoum," provided they are of the best grade.

DIPPING THE FIGS.

Whether the figs be packed in one way or the other, they should have previously been dipped. The dipping should be done immediately—that is, several hours—before packing. The dipping has a most pronounced effect on the figs, as it makes them soft, and in this respect affects both pulp and skin as well as improves the color. It equalizes the sugar in the figs and causes it to permeate to the skin. Even the poorest figs are improved by dipping, and many figs which, through careless handling, are not palatable will become so by dipping. The very best Smyrna figs are, however, not strictly dipped in the same way as the lower grades, but they are nevertheless moistened with salt water while being packed, and so important is this moistening that the figs could not be properly packed without being thus treated. The dipping should not be undertaken before the figs are thoroughly dried and cured, and only shortly before packing. If dipped and allowed to lie any length of time, the moisture will cause the color to darken. The air must be excluded from dipped figs as much as possible.

The process of dipping is as follows: Large and deep kettles are provided for keeping water constantly boiling either by steam or by direct fire, the size and number of kettles to be regulated according to the quantity of figs to be dipped. Alongside of the kettles should be a trough, with continuously running fresh water from a tank or ditch. Perforated buckets, holding about 5 gallons, are suitable for holding the figs while they are dipped. A long lever resting on a pivot, at one end furnished with a hook for holding the bucket of figs and at the other end heavy weights as a balance, makes a simple and practical contrivance. To every gallon of water in the kettles use about a quarter of a pound of salt. When sea water is to be had it is preferable. When salt is used the coarse common salt is better than the refined salt. The salt water can hardly be too salt; even a saturated solution would not injure the figs.

First fill the perforated bucket with figs, and by means of the lever rinse the figs by immersing them for a few seconds in the cold, fresh running water. Lift the bucket, and immediately after the greater quantity of water has drained off immerse it again in the boiling water for a few seconds. Then empty the figs on wire-screen frames placed a few inches above the floor and allow them to drain there for several

hours. While draining, the figs should be covered with a cloth or otherwise be kept dark. Figs dipped in the morning should be packed the same day. Those dipped in the evening should be packed early the next morning. Black figs are less apt to be discolored than white ones. The very finest white figs need dipping only in cold salt water. The salt in the water should not be rinsed away, as it contributes to the flavor of the fig and brings out the sweetness. It also tends to keep the fig moist.

ASSORTING THE FIGS.

As has been indicated, the assorting or grading of the figs should begin when they are exposed for drying. The spoiled figs are removed daily. At least three grades and sizes should be made. All the good figs should be separated into at least two sizes, the poor ones of any size forming a third grade not suitable for packing. The size of the figs of each grade can not be stated, as it depends entirely on the variety of the figs, but in every variety of figs there are at least two sizes, and among Smyrna figs there are four or more sizes. All figs which are not sufficiently soft and of good color and attractive in appearance should be at once consigned to the basket for the lowest grades. Figs which, on account of being sour, show a peculiar softness in the center, and which when pressed causes the pulp to exude, should never be allowed to go in among good figs. Any buyer who chances on such a fig is certain to condemn the box and is not likely to invest again. Softness and color of skin, consistency of pulp, and size are the four points to be judged in assorting.

The best class of Smyrna figs weigh about 22 to 23 grams each; the average Italian and French figs weigh only 7 to 8 grams, or about two-thirds less.

PULLING.

As soon as dipped and drained, the figs should be "pulled" or worked preparatory to being packed. The "pulling" consists in squeezing and pressing the fig by hand, and is more or less complicated and expensive. This pulling greatly improves the appearance and the actual quality of the figs, making them soft and tender. While pulling the figs, the hands of the worker should always be moist with salt water. This prevents the sugar sticking to the hand, improves the figs, and makes the work easier. Figs may be either pulled "flat" or "square." Flat pulling is used for very large figs, making them appear larger than they are and causing them to present their best part to the buyer. The fig, held with the eye downward and the stalk inward by the thumb and forefinger of each hand, is gently and gradually pressed, and by repeatedly moving the forefinger on the under or eye side of the fig, the upper side is pushed outward and forward. At the same time the fig edges are flattened out and pulled cir-

cular. When finished, the fig forms a flat disk, the eye being exactly in the center on the under side and the stalk in the center on the upper or opposite side. In order to make the fig larger yet, the part just between the stalk and the periphery of the fig is split by the thumb nail, which of course causes the fig to spread out in front. This, however, should be done only in extra fancy packing, and really does not improve the fig, though such split figs pack more easily and appear larger. Figs pulled in this way present their finest surface on one side, the coarse and hard part around the eye being hidden. The skin around the stalk end is always the finest and handsomest part of the fig, presenting a semitransparent and beautifully streaked skin, contrasting greatly with the opaque zone around the eye. The only method by which this fine part may be properly presented to view is by the above-described "flat" pulling.

The "square" pulling may be either very simple or may require considerable experience and skill. The finest figs in Smyrna are the "locoum" figs, which are not flattened out, but which are worked into little cubes or bags, each fig being first squeezed in the hand. Then the sides are pushed slightly inward, the front being left blunt, the upper and under surface flat, but the stalk end is slightly pressed in and the stalk bent down. All this manipulation simply tends to give to the fig the form of a cube. A less expensive pulling is used for common grades. It simply consists of squeezing the figs repeatedly, both hands being separately occupied. The figs are not shaped, but only made soft.

PACKING.

The packing should be regulated according to the quality of the figs. The Smyrna way of packing the best figs in "bars" can hardly be improved. Each box contains three or more such bars, parallel to one another, and so well packed that each bar may be lifted out separately without disturbing the other two in the same box. What is accomplished with great skill and practice in Smyrna may be performed here by the aid of a small mechanical contrivance called the "guide." This guide consists of several parallel strips of tin of the exact length of the interior of the box and fastened to two other pieces of tin also parallel, but at right angles to the first one, and one at each end. These cross pieces are to be of the exact inside width of the fig box. The height of these four pieces constituting the guide is to be about one-half inch greater than the box. The use of this guide is easily understood. When placed in the empty fig box before packing it divides the box into three (or more if wanted) equal longitudinal compartments, each made to hold one bar, consisting of several or many layers of figs. The width of each compartment must be made to correspond to the width of each fig when prepared, ready to be packed. For different sizes of figs different guides are required, and of course

different guides are also made for different sizes of boxes. The simplicity and convenience of this guide is evident. No matter what size of box and how many rows of bars are required to fill it, a guide may be made that will readily fit.

The process of packing "flat" figs is as follows: The guide is dropped in the box. A flat fig is then placed at the further end of the left compartment, with the "eye" face downward and the "stalk" end toward the packer. Another fig is placed partly on the top and partly behind this first fig in such a way that the front margin of the second fig just covers the center of the first fig, thus hiding the stalk. In this way the figs are thatched, or packed shingle fashion. The last fig in the row or bar must be partly folded upon itself, the stalk end being bent downward in order to fit the straight face of the box. If any one of the figs is a trifle too wide, the sides may be pushed together and made to fit the compartment. Care should be taken never to place too small a fig in a compartment. The next layer of the bar is packed in the same way, except that the box is turned around or the figs are otherwise packed so that their stalk ends point in the opposite direction from those in the first row; and so on, layer upon layer, until the compartment is full. If it is desirable that the box should be faced similarly on both sides, so as to present the same appearance if opened at either top or bottom, a slightly different method is required. In this case a guide is used which is about one-half as high as the box. A block or "follower" the size of the interior of the box, but only one-half as deep, is first slipped into the box, which should in this case be merely a frame, without bottom or top. On this follower is placed the guide, and the packing proceeds as previously described. When the last face is made the top cover is nailed on securely. The box is now turned over, the follower removed, the guide raised, and the other side packed the same as in the first instance. It is in some respects better to have only one guide, slightly higher than the box, and instead of one follower for the whole box, use one small follower for each compartment. The frame of the box is first placed on a loose drawboard, the guide is slipped down, then a follower in each compartment of the guide, after which the packing begins. After the cover is nailed on the box is turned over, the drawboard removed, each follower lifted out, and the box finished just like the other side. The followers should be covered with zinc, in order that they may be readily washed.

In packing square figs guides may be used or not. Guides may be



FIG. 30.—California dried-fruit press.

made round or square or any shape required, their object being simply to keep the layers distinctly separate. For common packing, shallow guides may be made for simple "facing." Facing consists of placing rows of figs in a certain harmonious order at top and bottom of a box not otherwise packed with bars or rows. Even lower grades of figs which are simply dumped into the boxes may thus be faced to great advantage and with small cost.

PRESSING.

The final process in packing figs consists in more or less forcibly pressing the pack. This should be done with all figs except the best,

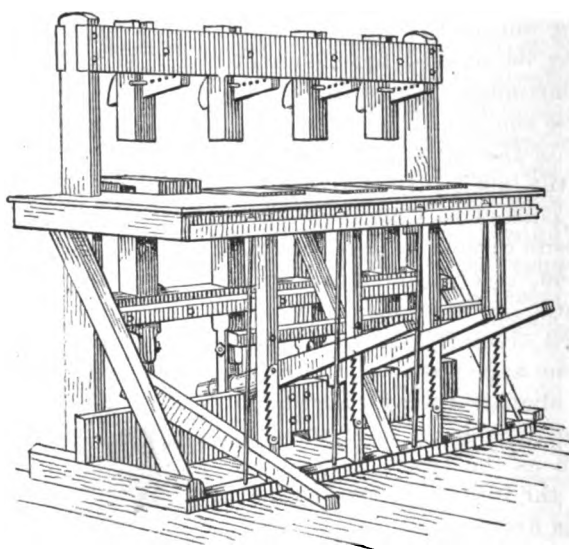


FIG. 31.—California raisin and fig press.

which are so thin skinned, pulpy, and delicate that the weight of one box on top of the other, to the height of seven or eight, is sufficient to press the figs securely in the boxes. And even with these, the best figs, a moderate pressure by means of a press adapted to the purpose secures a quicker and more even work than the old Asiatic way of simply allowing the figs to press themselves.

In order to secure this steady and regulated pressure there is no better machine made than the so-called "raisin" press (fig. 31). With this easily regulated lever press the slightest as well as the heaviest desirable pressure can be brought on the pack, according to the quality of the figs.

The final process is as follows: The guide being in the box, the bottom (or top) is nailed on. The pack reaches slightly above the box, even or almost even with the top of the guide. A follower is first put over each compartment of the guide and the box, placed in the press, is given a slight pressure. This has the effect of compressing each bar of figs separately. This first pressing should be heavy enough to bring the figs to a level with the top of the box. After the boxes have been left under the press levers for a few minutes they are removed and the guide is lifted from each box. This is readily done by placing

the fingers on the followers and pressing them gently, while the other hand loosens the guide and finally lifts it out. The figs will have preserved the regularity with which they were packed and the line division between the bars kept straight and sharp and so perfect that a flat table knife may be drawn through the line without cutting the figs. This whole operation is quickly performed, and requires less time to be carried out than to be described. The pressing of other figs, packed with or without guides, in square, oblong, or round boxes, is accomplished in the same manner, easily modified to suit different requirements. In the case of round boxes round followers must of course be used.

If the pressure brought on the figs is very great the boxes may give and open while in the press. To avoid this there may be used a guard of galvanized iron of such size as to snugly fit the box on the outside, the height of the guard being, however, half an inch less than the box. The guard should not have a solid bottom, but one open in the center, a flange extending for half an inch along the sides being sufficient. This is done in order that the box may be pushed out if pressed too tightly into the guard. If the boxes are strong and well made, even this flange may be dispensed with, the guard then taking the form of a single band fitting outside the fig box.

After the guide has been lifted a final pressure may or may not be needed in order to allow the nailing on of the covers. The objects of pressing the figs are several. First, the necessity of having the pack solid, then to prevent evaporation and the drying out of the figs, etc. Smyrna figs are packed with pieces of sweet bay or laurel (*Laurus nobilis*) stuck here and there among the top layers. The aromatic smell of these leaves adds to the flavor of the figs and to the appearance of the box. The wild laurel (*Oreodaphne californica*), which is yet more aromatic and pungent, answers the purpose equally well.

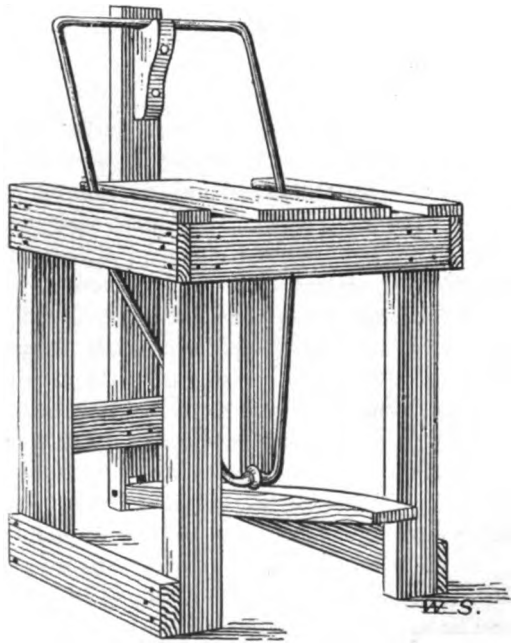


FIG. 32.—Green-fruit press in use in the United States.

In California the growers are now packing the figs in 5 and 10 pound boxes. Instead of bars the figs are packed in slightly oblong blocks of 1 pound each. Each such fig block is wrapped separately in paraffin paper, and in some instances tied with a colored ribbon. Five or ten such blocks are placed in one box. This packing, while now much in use, is not to be recommended, as it hides the figs and the buyer does not know what he gets. The idea of packing the figs in blocks of 1 pound each is, however, an excellent one for small figs, but the largest figs could hardly be accommodated to such small blocks.

CHAPTER XIII.

SHIPPING FRESH FIGS.

Fresh figs are hardly known outside of the districts where they are grown, though few fruits are more relished when once introduced. In the large centers of population in England and France fresh figs are counted among the indispensable luxuries, and many people are engaged in cultivating them for the market, either in hothouses or in the open air. Before rapid transportation became possible fresh figs could not be shipped any distance from the place where grown. Now figs may be sent 300 or 400 miles if properly packed. When the system of packing is better understood, and when special cars are devoted to transporting fresh figs, it will be possible to send them fresh and in good condition much greater distances without much risk or loss.

There are two points to be kept in view in sending fresh figs. The figs must be picked when fully ripe, but before they have begun to shrivel, and they must not touch one another in the box. The best time to pick the fruit is an hour or two after sunrise, when all the dew has dried away. Figs picked when a light dry wind is blowing will keep longer. Only perfect figs should be used, and as nearly as possible all should be of the same size, with no small figs mixed in. It will not pay to ship anything but the largest size of the best varieties. No uniform grade of boxes is possible, as each grade must depend upon the size of the figs and their shape and variety. The boxes should not weigh over 10 pounds, while 5-pound boxes would be even better. The ends should be of three-fourths, the bottom of one-half, and the sides and top of one-fourth inch boards. There should be an open crack between the pieces of the bottom and top, and the sides should have an open space of one-fourth of an inch at top and bottom. The boxes should be only deep enough to hold one layer of figs if the variety is tender, but if thick skinned it might hold two layers.

In order to keep the figs from crowding one another long strips of paper are used. Any stiff white or brown paper will do. These strips are as long as the box and about twice as wide as the fig. The strip is folded lengthwise before being placed in the box. When in position, half of the folded strip will rest on the bottom of the box, while the other half will stand up at right angles. In the angle between the two the figs are placed one by one in a single row, thus resting on the bot-

tom part of the strip, while the upright part separates two rows. Fresh fig leaves may be used in the same way, but are not quite so handy, though if properly placed they give a tasteful appearance to the box.

Salicylic-acid paper and wax paper have also been recommended. The latter is less useful than the former, as it excludes the air. Salicylic paper aids in preserving the figs, and is cheap and practical. It may be used instead of common paper, or the common paper may be turned into salicylic paper by being sprinkled with a solution of salicylic acid in alcohol, in proportion of 1 pound of acid to 10 gallons of alcohol.

But figs may be successfully shipped long distances by simply being packed in boxes without paper or leaves, the number of layers always to depend on the quality of the fig; but it is safe to say that even the most thick-skinned figs should preferably be placed only two layers deep, while very delicate figs should be packed in one layer only.

CHAPTER XIV.

HOW TO DESCRIBE FIGS.

NAMES.

In noting the names of figs in the following catalogue the writer has adopted the plan of first using the name under which he has found the fig best and most correctly described, or the name given in the locality where the fig is principally cultivated. The first name is thus that under which the fig is best known. All the subsequent names printed in other type are synonyms or names for the same variety used elsewhere. The words within parentheses either indicate the locality where grown or the author of the description. If there be doubt as to which, a reference to the published list will clear the doubt. Names have not been translated except in a few instances where the cultivation of the fig in English-speaking countries warrants the use of an English name. Much harm and confusion have been caused by citations of only translated names, and if this custom, so often employed by theoretical writers, should be adopted, the final object of identification of all fig varieties suited to and valuable for cultivation would be lost. In some instances where the pronunciation of the foreign name is especially difficult to English readers, the translated name has been given preference, with the foreign name following in different type as synonym.

French or other names which begin with the article *De la*, etc., are arranged under their principal name. Thus the variety called *De l'Archipel* is found under *Archipel*, etc. As much as possible, such epithets as white, black, red, round, and long have been discarded, as they would too widely separate nearly related varieties in the catalogue. For instance, *White* and *Long Verdal* are placed under the heading of *Verdal, Long*, etc., thus enabling the reader to compare the description of the respective varieties more readily.

VALUE OF VARIETIES.

The list of names of figs and their descriptions are given for two distinct reasons. The first reason is that we may learn of the figs grown in foreign countries, where fig culture has been successfully carried on for two thousand years or more, while our own fig culture dates back only forty years. Many growers constantly cry out that fig culture is not a success in California and that figs do not do as well here as in the old countries. In answer to this, the writer begs to point to the long list of fig varieties known, which at least proves that a large number of varieties is required in order to insure this suc-

cess in foreign countries, and, furthermore, clearly establishes the fact that a fig which is eminently successful in one locality is as glaringly a failure in another country not so very far away. How, then, can we judge as to the suitability of any locality to the culture of the fig, with hardly a dozen varieties generally distributed and grown to select from, and with the erroneous idea commonly accepted that this country already cultivates among that dozen all the best varieties of the Old World? Among the hundreds of varieties of value grown in the Mediterranean districts, some will no doubt be found to succeed in the Pacific States and prove valuable. But our true success will in time be based on our ability to originate new varieties suited to our conditions, which in many respects are very dissimilar to those of the fig countries of the Old World. This will not be done until the capri-fig and the Blastophaga have been well established here, when accidental seedlings will pave the way for more scientific and intelligent efforts to produce what we so much require—varieties suited to localities where the figs are to be grown.

Another object of this catalogue is to enable our growers, to some extent at least, to identify such varieties as they now grow under fictitious or wrong names. For many of these varieties the writer has been unable to procure descriptions; others are only imperfectly known—a defect which it is hoped will be corrected in time.

DESCRIBING THE VARIETIES.

Even in the best horticultural books figs have had little attention and have been insufficiently described. This is especially apparent in French books on horticulture, which is the more strange, as France is the country where more care is bestowed on fig culture and fruit culture generally than anywhere else. All late French authors have copied descriptions given by the older ones, without critical research and comparison; the nurserymen in their turn have copied from one another, and no one has apparently even attempted to describe a fig so that it could be reasonably well recognized. The great number of varieties and their distribution in widely separate countries have made comparisons very difficult. In order to remedy this a type collection of figs has been established at Niles, Cal., where about 120 varieties are now growing and in bearing. Some seventy-odd and mostly new varieties have been added lately by courtesy of the Secretary of Agriculture. In properly describing a fig it is not sufficient to give size, shape, and color, as is so generally done, as there are scores of varieties in which these qualities are exactly similar, but which differ essentially in other points. A fig to be properly described must have all the following points mentioned and the same order of description must be followed, so that a comparison may be readily made with other varieties. The description should begin with the most apparent characteristics and end with those less readily seen. The following are the principal features of the fig, and in describing these even the

experienced horticulturist would do well to use this list as a check list, taking up one character at a time in the same order of succession in which they follow one another here: Crop, size, shape, neck, stalk, ribs, eye, iris, skin, color, pulp, meat, growth of tree, branches, leaves, quality, soils.

If any one of these points is not touched upon the description must be considered defective, though it may still be possible to recognize the variety, provided it possesses some very predominant characteristic which readily distinguishes it from other figs. For students or horticulturists who examine many varieties a blank is recommended with the above headings, each on a separate line, ready to be filled out. In order that the descriptions may be fully understood it will be necessary to consider each heading separately.

Crop.—It is always necessary to mention first how many crops the fig tree matures, and then describe each crop separately if both are of importance. If in the following no particular crop is mentioned, the description always refers to the second crop. In copying descriptions of figs from Northern authors we can be almost certain that the first crop is referred to, provided the figs have been grown out of doors, and generally so even if cultivated under glass, as figs suitable for such purpose are generally, though not always, those which mature a first crop.

Size.—Roughly estimated, the size might be indicated as “small,” “medium,” or “large.” I would consider all 1 inch or less in diameter as “small;” those between 1 and 2 inches as “medium,” and those above 2 inches as “large.” An average fig should be taken, one neither too large nor too small. The measurement should be made from the neck to the eye, or, to be more accurate, from the junction of the stalk and neck to the eye. For “width” the greatest diameter at right angles to the former should always be given, and in order to indicate the exact shape it is necessary to state whether the greatest width is at the center, below the center, or at the apex. To English readers the English inch is the most common measure, continental writers using the centimeter only. A scale of reference showing the relation between these two measures is appended (fig. 33).

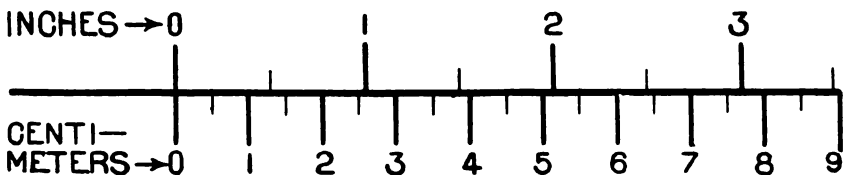


FIG. 33.—Diagram for comparison of inches and centimeters. (1 inch = 2.54+ centimeters; 1 centimeter = 0.39+ inch.)

Shape.—If the greatest width is at the center, the shape is called “ovoid” or “egg-shaped;” if between the center and the apex (or eye),

the fig is "pear-shaped" or "turbinate," with rounded top; if at the apex, the fig is "bell-shaped," and if the apex or surface around the eye is flattened out, the fig may be called "obtuse," or flattened at apex like an onion. The shape of figs may be classified under two heads, round or oblong. "Round" figs are those in which both diameters are of the same length or in which the width is greater than the length from stalk to eye. "Oblong" or "turbinate" figs are all whose length is decidedly greater than the width. The length of the respective diameters enables the fig to be divided into two general classes, the characteristics of which are fairly constant. A better expression for a round fig would be globular, but as the word "round" has been generally adopted by other writers, no change has been made.

Neck.—The neck of the fig is the part situated nearest to the stalk. The neck may be "none" or "absent;" "no neck" if the fig is entirely globular; or it may be "short" if about one-fourth the long diameter of the fig; "medium" is above that, but not reaching one-half the length of the long diameter of the fig, and "long" if above half the length of the fig. The neck must not be confounded with the stalk, as is often done. The neck is part of the main body of the fig; the stalk is the part outside of the fig proper, which connects the fig with the branch on which it is suspended. The neck may be "well set" if it is considerably narrower than the body of the fig, or it may be "gradually tapering" to the stalk; or it may be "very thin," "slender," or "compressed sideways," all of these expressions being readily understood. (See fig. 34.)

Stalk.—The stalk connects the neck or body of the fig with the branch upon which it is suspended, and should never be considered in the measurement of the fig. It is of greatest importance to know the average length of the stalk, as it varies much with different varieties, being "short," "medium," "long," or "very long." The same expression is used in regard to the neck. The stalk may be "rounded," "flat," "three-cornered," etc., all points which should be noted in describing a fig. The length of the stalk varies to some extent in the same variety, and care must be taken to give a true average or to note any unusual variation in length, thickness, etc. It is also of importance to note whether the stalk breaks off readily from the branch or must be cut off when the fig is ripe. (See fig. 34.)

Ribs.—The ribs are longitudinal ridges running from stalk to eye. They may be confined to the neck, to the body of the fig, or may extend to the eye. They are higher or lower, or take the shape of mere lines, generally colored darker. They may branch, or higher ribs may alternate with lower ones, or they may partly dissolve themselves into warts. Some figs possess no trace of ribs; in others the ribs fade out or fuse at eye or neck. (See fig. 34.)

Eye.—The eye is the opening in the broad end or apex of the fig. It may be "closed" or "open," and there are various degrees of

openness. The eye may be "sunk" if below the surface of the fig; it may be on a level with that surface, or it may be "protruding." In such cases it is generally surrounded by an elevated ridge, like a crater. The "iris" is a colored zone surrounding the scales of the eye, situated between them and the elevated ridge. It is not identical with the ridge itself. Some writers refer to the eye as the "mouth" of the fig or the "ostium." (See fig. 34.)

Scales.—The scales closing the eye are either "few" or "many," "broad" or "narrow," "colored" or "pale," "margined" or "uniform" in color. They are "flat," or they may stand out upright, or may even greatly protrude.

Skin.—The skin is "smooth," "warty," "rough," "hairy" or "downy," "glossy," "waxy," etc., all these expressions being readily

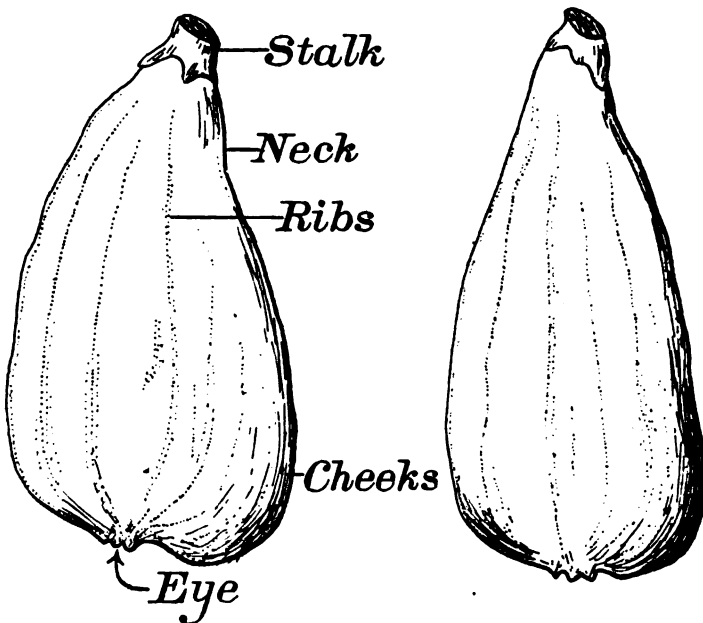


FIG. 34.—Brunswick fig. Illustrating the various parts of a fig.

understood. It may be dotted over with light specks or large spots. It may be "thick" or "thin," adhering to the meat or readily separated. The skin may also be "tough" or "tender," and finally it may crack at maturity in longitudinal or in transverse lines, deep enough to show the meat underneath. This cracking of the skin must, of course, not be confounded with the cracking or splitting open of the fig under unfavorable conditions.

Color.—The color should be given, separately, if necessary, both for neck, body, and apex, eye, iris, scales, for shaded side or for the side exposed to the sun. The fig varies considerably in color. For instance, the Adriatics grown in the vicinity of San Francisco Bay always retain a green or bluish-green color, while in the interior they

often turn bright golden yellow, etc. This variation in color is the greatest obstacle to a proper description of the fig, and it is therefore of importance to always state where the description was made.

Pulp and meat.—The pulp is the inner soft part of the fig surrounding the seeds. Between the pulp and the skin is found the meat. While the pulp is often red, the meat is rarely so, though it is often streaked red or violet. The pulp may be "white," "yellow," "red," "purple," "opaline," "rose," "streaked," etc., and may be "coarse" or "fine." The pulp and the meat should never be confounded, but mentioned separately.

Seeds.—The seeds are either "large" or "small," "few" or "many"—relative terms, of course, but terms which may be used to great advantage. The size of the seeds of the imported Smyrna figs may be considered as a standard with which to compare others.

Growth.—The growth of the tree may be "strong" or "weak," "upright," with many or few branches, or with drooping branches, etc. The leaves are either "large" or "small," "entire" or "deeply lobed," "dark" or "light," "glossy" or "hairy," "regular" or "lopsided." The lobes are either 3, 5, or 9 in number, or the margin may be "entire." They may be "acute," "pointed," "rounded," "obtuse," "cuneate," "wavy," or "smooth." As the leaves vary on each tree, an average leaf adjoining a fig should always be taken as a model for description. Finally, it should be stated whether the stalk of the leaf is unusually "short" or "long," "dark" or "light."

CHAPTER XV.

CATALOGUE AND DESCRIPTION OF FIGS, INCLUDING SMYRNA FIGS AND CAPRIFIGS.

In the following catalogue the names of figs printed in black-face type are those which stand as distinct varieties. Those printed in italics are synonymous with others, and should be looked for under the respective names given immediately following. Where more than one name is known the most desirable name is that given at the beginning of the line, while the names in italics following are less-known ones. Names within parentheses indicate the locality where grown. For instance, Brayasque (Provence) indicates that the name is used in Provence, France. *Ficus sylvestris* var. *festinatissima*, Geny, indicates that Geny is the author who named the variety. The word "variety" is abbreviated to "var."

Most of the descriptions are based upon examination of figs grown in California, especially at Niles, where are found the United States Government collection and the private collection of Mr. John Rock. Some descriptions have been taken from foreign works on figs, but only in cases when the variety has not been seen by the author.

Abakour amellal.—A white fig, the name meaning early white: extensively grown in Kabylia. Two crops.

Abakour aberkan.—A black fig from Kabylia. Bears many and very good first-crop figs called "bakour." The word means early black.

Abelr'endjour.—A black fig from Kabylia which does not require caprification.

Aberzigzaou.—A white fig from Kabylia.

A bois et fruit Jaspé—JASPER.

A bois Jaspé—JASPER.

Abondance—FRANCHE PAILLARD.

Abondance.—Said to be another name for VERSAILLES.

Abouh'archaou.—A white fig from Kabylia. Is not caprifid.

Aboulil.—A white fig from Kabylia. Produces two crops.

Abouremman.—A black fig from Kabylia. Does not require caprification.

Abouzouggarr.—A white fig from Kabylia. Requires caprification.

Adam.—Size medium, roundish turbinate, or flattened at apex, with short or no neck, which when present is distinct. Eye rough, with distinct iris. Scales rosy amber. Skin with distinct, shallow ribs, yellowish, with dingy brown flesh, dull, not waxy. Pulp dull amber to red. Meat thick, slightly rosy. Quality medium, but a very handsome fig when grown well. Leaves small, five-lobed, shallow, crenated, 6 inches long by 7 inches wide. Two crops. First crop above medium, turbinate, about 3 inches long by 2 inches wide. Neck medium to large. Stalk small. Eye large, with brown, protruding scales. Color of skin dull green, with a violet flush along the ribs and on the sunny side. Meat yellow. Pulp amber-white, with brown streaks.

A very handsome as well as good fig, desirable on account of its brebas. The second crop is less desirable. The first crop is excellent around Niles, Cal.

Adriatic—*Grosse Verte*; *Nebian*; *Nubian* (?); *Fico di Fragola*; *Strawberry Fig*; *Verdone* (Rome); *White Adriatic*; *Parker's Smyrna*; *Delamater's* (California).—Size above medium; shape variable, more or less rounded turbinate; the first crop more round than the second crop. Neck medium, stalk short. Ribs obscure. Eye open, with red iris. Skin very thin, greenish in shade, in sunlight bright greenish-yellow or yellow, according to locality where grown. Pulp bright strawberry red or in some localities violet-dark red with violet streaks in the whitish meat. A good and strong grower with large, shady, round head. Leaves deeply 5-lobed, oblong, bright, glossy green. Two crops. The first crop drops or if it stays is small and of poor quality, and ripens frequently with the second crop. If capriciated the first crop matures and becomes of very good quality. (Pl. XIV.) Extensively planted in California. Should never be planted extensively except where it is known to do well.

A fig of varying qualities, according to the locality where grown. Prefers rich, alluvial soil, not too moist. Most excellent at Atwater and in the vicinity of Niles, and in many other localities in California. Better in the foothills than on the interior plains. In wet places the fig bursts and sours badly. In localities where the fig does well it must be considered as one of our very best figs. It is not identical with the fig known as Adriatic in Italy. The three names under which it has been known in California were given by growers who desired to sell young trees or cuttings. It was introduced into California from Italy by very early settlers in the fifties, one of the first trees being planted at Big Oak Flat, in the Sierra Nevada foothills. In most localities this variety will be superseded by better kinds.

Agen—*Grosse du Draguignan*.—Medium, rounded turbinate, flattened at apex; skin thin, green with a brownish tint; a deep brown chocolate with mixed green around the apex. Eye open, iris reddish brown. Pulp dark red, very sirupy and sweet. One of the best figs, where it does well. Should be tried everywhere. Ripens very late. Requires capriciation at Niles.

Ajenjar.—A black fig from Kabylia. Bears two crops.

Albi primitici—ALBO.

Albicello—ALBO.

Albicougris—BORDEAUX.

Albo—*Bianchetta*; *Biancoletta* (Porta); *Albi primitici*; *Ficus carica* var. *luteus* Aldr.; *Albicello* (Toscana); *Mattaro* (Lunigiana); *Fico Dorato* (Altrepò Pavese); *Biancolini* (Milan); *Fichi d' Oro* (Piacentino); *Moscadello* (Como); *Fico zentil* (Verona); *Gentile* (Bologna).—Size 2½ by 2½ inches or over. Shape round-obtuse, and flattened at apex. Largest diameter at apex or below center, no neck, stalk medium. Ribs in mature fruit indistinct. Eye medium, open, scales large, amber-rose. Meat white, pulp amber with a few large seeds. Skin bright yellow, more so than in most other figs, not excluding the *Gentile*. Leaves large, 3 to 5 lobed, much longer than wide, the end lobe being pointed, margins wavy, surface quite hairy or pubescent, more so than most other varieties. Growth of tree medium. Two crops, the brebas being larger and more flattened than the second crop. One of the best Italian figs, generally cultivated all over that country, and only inferior in quality to *Pissalutto* and *Dottato*. Prefers moist and rich soils, and especially sandy loams. It is the cherished fig in the markets of Pavia and Milano, where it is sold under name of *Biancolini* or *Moscadello*. (Fig. 35.)

Albo Master.—A white Italian fig.

Amarouna—*Amaroun*; *Ficus amara* (Risso); *Ficus dylo* var. *amarula*, Geny; *Bitter skin*.—Medium, 2 inches long, pyriform; skin reddish brown mixed with green. Very bitter when cracked. Pulp red. (Sept. to Oct.) Nice and Provence.

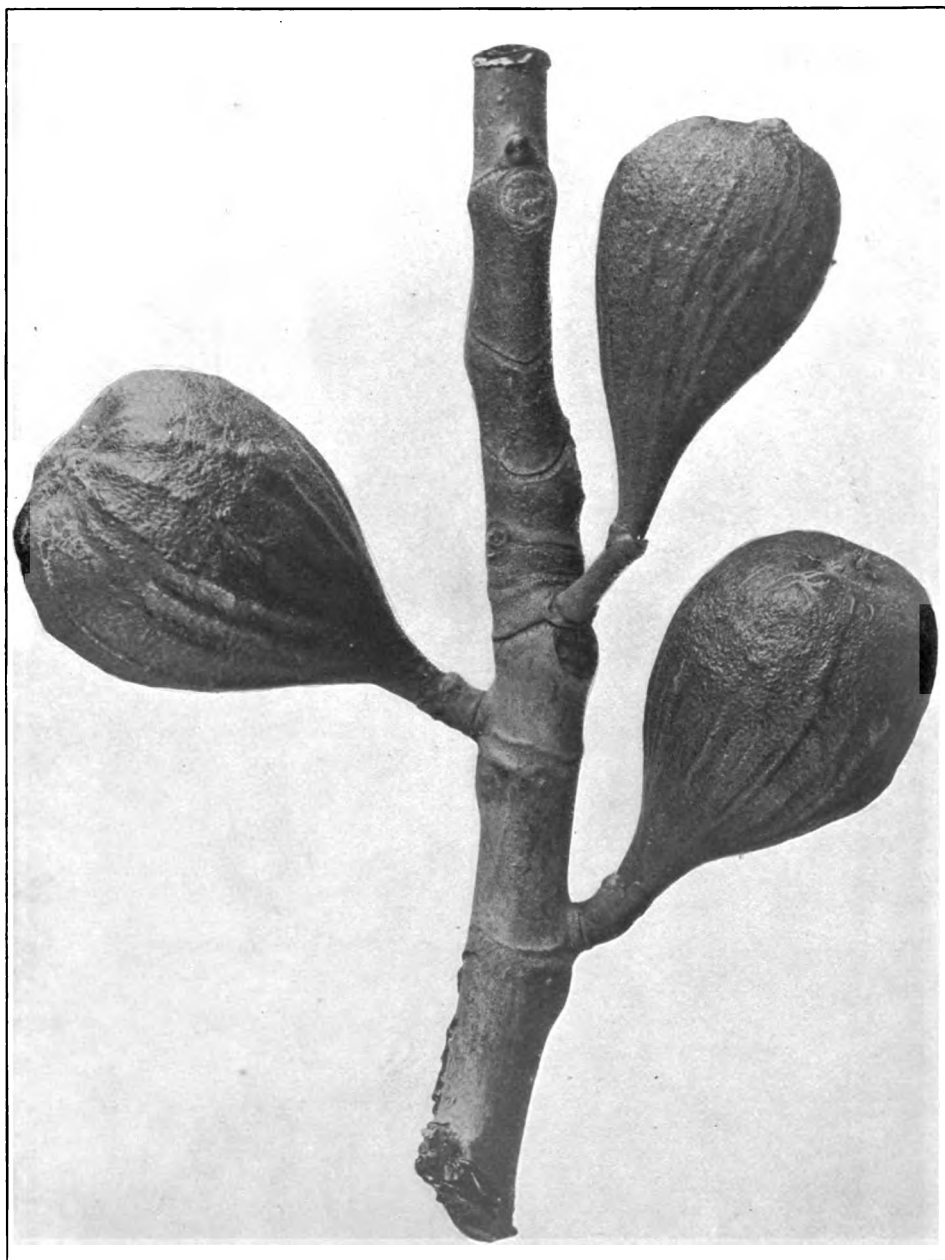
Amaroun—AMAROUNA.

Angélique—*Courcourelle blanche*; *Angélique blanche*; *Melette*; *La Melette* (Roz.) according to Duhamel. —Medium, 1½ by 1 inch, pyriform, longer than wide, ribs prominent; color yellowish white with long greenish spots. Pulp white, in center fairly rose. Leaves 5-lobed, crenate, lobes pointed. A good fig of fine flavor. Paris and Provence.

Angélique—ANGÉLIQUE JAUNE.

Angélique blanche—ANGÉLIQUE.

Angélique Jaune—*Yellow Angélique*; *Angélique* (Thomas Rivers & Son); *Vendome*.—Two crops resembling each other. Fruit large, pyriform, about 3 inches long by 1½ inches to 2½ inches wide, variable in size and form. Neck distinct, with small or no stalk. Eye small or medium, open, with amber scales and no iris. Skin smooth, of a greenish-yellow to deep sea-green color, with scattered lighter specks. Many distinct but shallow ribs. A faint gray



CAPRIFICATED FIRST CROP ADRIATIC FIG. NILES, CAL., JUNE, 1901.

bloom between the ribs at the stalk end. Pulp varying from deep brownish amber to deep violet-brown amber, sometimes distinctly rosy. Meat greenish white. Pulp fine, juicy, sugary, and sirupy, but with little flavor. Leaves large, entire or trilobate, in which case the lobes are shallow. Tree a strong, handsome grower, with a dense crown and upright limbs. A most valuable fig and one of the best at Niles. The description is made from figs ripe October 8. This variety is distinct from Angelique, from which it differs in the size and form of the fruit, its deeper flesh or pulp, its larger and more entire leaves. This will probably prove a fine table fig, superior to the ADRIATIC. Hogg does not mention this fig, his description referring to the ANGELIQUE proper. These two figs can not be considered as nearly related varieties, but are quite distinct. The fig described above was originally received from Thomas Rivers & Son under the name of Angelique. The identification is made from descriptions of ANGÉLIQUE JAUNE by French nurserymen. (Fig. 36.)

Angélique Noire.—Size below medium, roundish or oblate, skin dark, flesh bright red, rich. Strong grower and moderate cropper. (Barron.)

Anouhalal.—A black fig from Kabylia.

Apple fig—SAN PEDRO, WHITE.

Ar'aním.—A white fig from Kabylia. Does not require caprification.

Ar'aním aberkan.—A black fig from Kabylia.

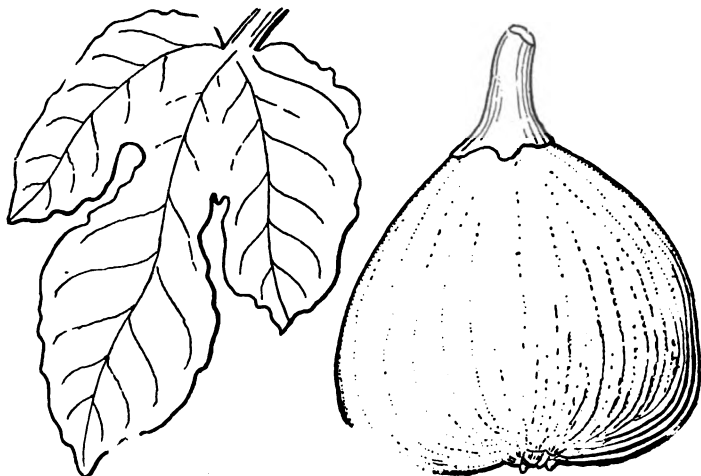


FIG. 35.—Albo fig.

Arbal.—Fruit medium pyriform, about 2 inches long by $1\frac{1}{4}$ wide, tapering from the equator. Ribs many, indistinct, and irregular. Stalk very short, or none. Eye small, open, with small violet scales. Skin rather rough and downy. Color of skin olive green, mottled, and flushed with violet brown. Pulp clean amber with brown flush, fine and juicy. Meat white. Inner scales of eye rosy red. A fine, highly-flavored fig of insignificant appearance. Tree medium grower. Leaves medium or below, 5-lobed.

Arbauda—RUBADO.

Arbicone—SAN PEDRO, BLACK.

Archipel—*De l'Archipel.*—Large obovate, variable in size and shape, $2\frac{1}{2}$ by $1\frac{1}{4}$ inches or $2\frac{1}{2}$ by $2\frac{1}{4}$ inches; neck short, but sharply set off. Ribs indistinct or indicated by lines. Eye flat, small, closed by pink amber scales surrounded by a rough iris. Skin smooth, especially around the eye. Color, olive green to reddish purple, mottled all over with minute, round, and larger oblong gray spots; near the stalk end the color is light olive green. Pulp tender, very pale or white opaline-amber; very fine, with small seeds. Meat white. Now and then there is a rosy fiber in the pulp. A very tender fig, but not highly flavored. Leaves medium to small, 3-lobed, deep green, rather glossy. According to English authors the color is more chestnut brown. First crop: Large, obovate, $3\frac{1}{4}$ inches long by 2 inches wide. Ribs indistinct, outlined by violet streaks. Neck short and gradual. Stalk very short. Eye small with white, small scales closing the opening; a lighter colored iris. Pulp and meat whitish amber. A sweet and juicy fig, without much distinct flavor, but of good

taste. The skin is thin and cracks open readily at maturity. The first crop is a valuable and desirable one at Niles, Cal. One of the figs imported through the United States Department of Agriculture. Second crop.

Argenteuil—DAUPHINE.

Argusela—DOUQUEIRA NEGRA.

Ashridge Forcing—BROWN TURKEY.

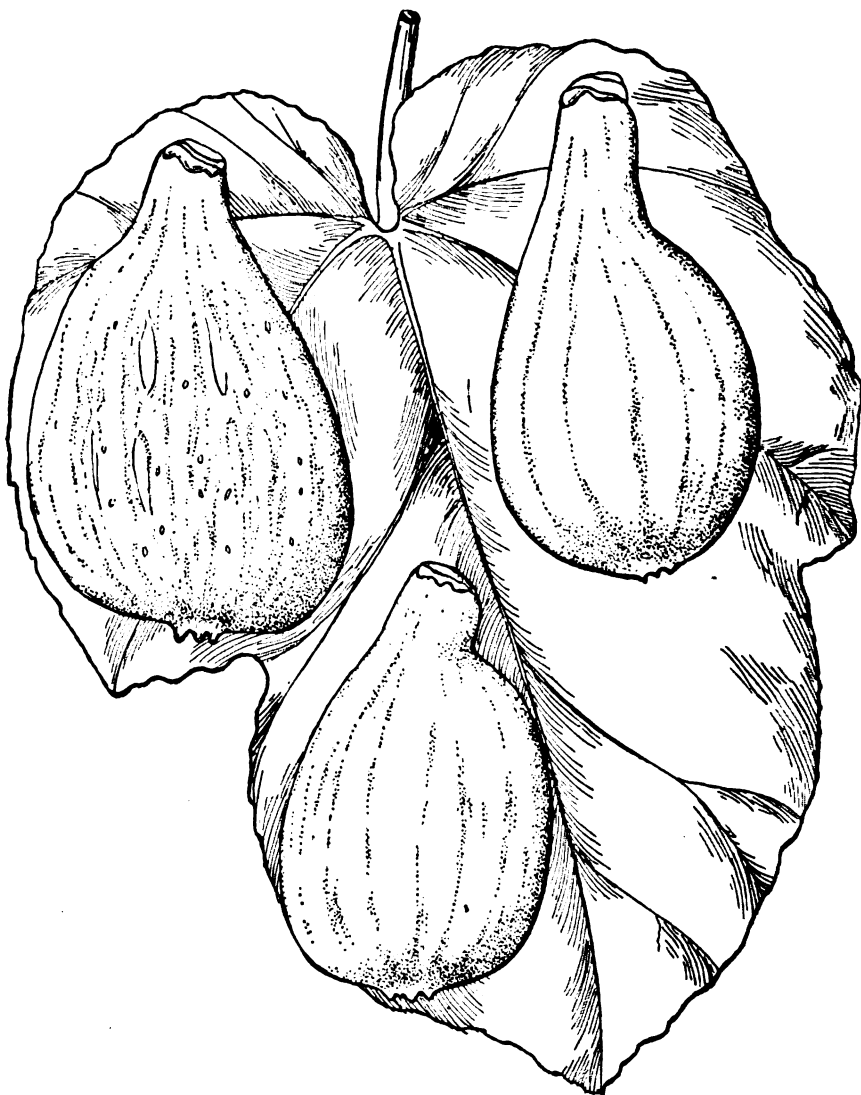


FIG. 36.—*Angélique Jaune* fig.

Athènes—*Figue d'Athènes*; *D'Athènes*; *Blanche d'Athènes*; *Marseillaise*; *Marseillasa*; *Burnham's Smyrna*; *Ficus marsiliensis* Garidel.—Small, roundish, or turbinate, 1½ inches in diameter, with indistinct ribs at the stalk, depressed at apex. Skin rough, color whitish, flushed with yellow and green, no bloom. Pulp pale-red, opaline toward the stalk; very sweet but not highly flavored. One of the best drying figs of good drying and keeping qualities. This fig is distinct from the *White Marseillaise*, which possesses white or amber-colored pulp, and which is also an equally fine fig for drying. Cultivated in Provence around Marseilles, Nice, etc.

A Tres recolte.—Possibly the same as TRIFERO.

Atwater.—Length about 2½ inches, width about 2¼ inches, of average large fruit. Stalk and neck very short; fruit flattened or sometimes slightly turbinate, with broad and indistinct ribs from stalk end, which in the zone of the eye become more numerous, narrower, and quite distinct to very distinct. Cheeks uneven, swollen, and somewhat angular. Slight bluish bloom. Skin very waxy, of a yellowish-green color, somewhat streaked yellow and green, the yellow predominating around stalk and eye; few white specks. Eye large, or very large, open scales protruding, of a brown color edged dingy white. Eye, except scales, rather flat or even sunk. Meat yellowish white, very thick or wider—indeed, in some figs thicker—than the pulp. Pulp, just before real maturity, pinkish, but at full maturity amber white, transparent; in some figs here and there flushed pink. First crop ripe by July 1. It is a very delicious fig, resembling PETERS WHITE, but has less pink in the pulp, while the latter has less vinous acid and is less flavored. PETERS WHITE is the superior of the two varieties growing side by side in Merced County, Cal. ATWATER ripens about one week before PETERS WHITE. Second crop is much smaller, but sweet. The true name is not known, the present one being provisional only.

Aubico Blanco.—TAPA CARTIN.

Aubique.—SAN PEDRO, BLACK.

Aubique Blanche.—TAPA CARTIN.

Aubique Leroy.—France.

Aubique Noire.—SAN PEDRO, BLACK.

Aubique Violette.—SAN PEDRO, BLACK.

Aubiquon.—SAN PEDRO, BLACK.

Aubran Blanc.—France.

Aulguo.—SAN PEDRO, BLACK.

Avarcugo.—France.

Azagour guilef.—A black fig from Kabylia. Does not require caprification. The words mean hog's back.

Azaicht.—A black fig from Kabylia. Bears two crops of figs. Does not require caprification.

Bagassa.—MOURENAO.

Barbillanne.—COTIGNANA.

Barbillonne.—Size medium, rounded, 1½ by 1½ inches, no neck, stalk short; ribs narrow, distinct wavy, especially on the cheeks; skin thin, rather waxy. Eye small, open, but not elevated nor prominent. Scales small, black. Skin very dark black, with violet reddish flesh and thin, violet bloom near the stalk. Pulp coarse, amber-white; seeds rather large, but few. Meat white. A very juicy fig grown at Argenteuil for Paris market. Leaves rather small, 5-lobed. First crop: Large to medium, round turbinate to pyriform, variable in size and form. About 3 inches long by 2½ inches wide. Ribs distinct. Eye very large, with many large, protruding scales. Neck distinct to nose. Color green, with a violet flush on the sunny side and on the apical part around the eye. Pulp sweet and juicy, as well as highly flavored; of a pale amber, with rosy streaks. Meat white, with rosy violet spots. Very fine brebas which can be highly recommended. A good bearing fig, which should be grown for its brebas, as the second crop is much inferior to the first crop. (Fig. 37.)

Bardakjik.—*White Bardakjik; White Baltadjik; Bartadjic.*—Large, oblong, pyriform, with long stem and neck. Color beautiful sea green. One of the very best of all figs. Grown extensively in the Smyrna district, where it is valued higher than any other for eating fresh. Soft and flabby. Meat and pulp blood red; when dried the pulp becomes very dark. Skin is very thin and delicate. It is one of the leading varieties for drying in the Aidin district. (See Smyrna figs, p. 278.)

Bardakjik, Black.—*Bartadjik; Black Bardakjik.*—Large, oblong, pyriform, black. A very fine table fig from Smyrna, Asia Minor, where, with the White Bardakjik, it is considered one of the very finest table figs. It will also dry well. (See Smyrna figs, p. 278.)

Bargenron.—About 1½ by 1½ inches. Oblong or subrotund. Color pale violet on yellow ground. Pulp red. A very late fig. Good flesh, as well as dry. Requires dry soils.

Barnique.—South of France.

Barnissenca.—BERNISSENCA.

Barnissenque.—BERNISSENCA.

Barnissoto.—BARNISSOTTE, BLACK.

Barnissotte.—BARNISSOTTE, BLACK.

Barnissotte, Black.—*Black Barnissotte; Barnissoto; Barnissotte; Black Bourgasotte; Bourgasotte Noire; Brogiotto Nero; Brogiotto fiorentino; Grosso figo; Bellegrade; De Bellegarde* (according to Hogg); *Ficus barnissotte*, Tournafort

and Risso; *Ficus erin.* var. *jucunda*, Geny; *Ficus polymorpha* Gasparini var. *depressa*.—Medium, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches by $1\frac{1}{4}$ long; broader than long, flattened at apex, with no neck or very slight neck and rather uneven cheeks. Ribs distinct and even, well protruding, but not as much so as in RABY CASTLE, but quite distinct from stalk to apex. Eye sunk, closed, with slightly protruding iris and with a few large brown scales. Skin waxy, dull, not downy, of an even black color with a violet flush and reddish hue in the shade. Bloom clear blue extend-

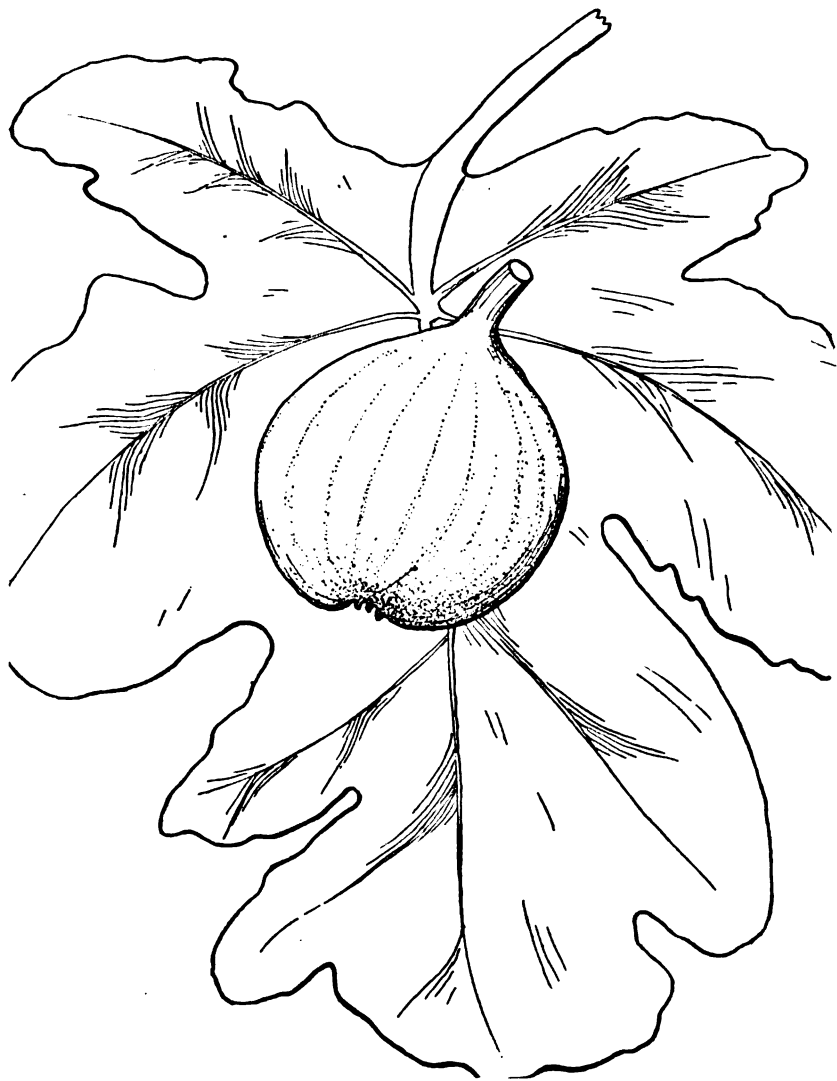


FIG. 37.—Barbillionne fig.

ing in a zone from the stalk half way down to the apex, but sometimes confined to the vicinity of the stalk. Meat pink, the interior of the stalk and neck bright yellow. Pulp deep blood red. A very late fig; September until frost. First crop somewhat larger, skin rougher and pulp more yellowish. Rare. Leaves 3-lobed, almost entire with undulating margins of medium size densely covering the branches. A most excellent fig and one of the very finest for table. Italy, southern France, Spain, etc. (Fig. 38.)

Barnissotte Blanche—BARNISSOTTE, WHITE.

Barnissotte Grise.—Medium to small. Rounded turbinate without neck and with very short stalk. Ribs narrow and shallow. Skin waxy, of a sea-green color mottled dark gray, with some bloom. Eye closed with rough iris. Pulp violet red. Meat whitish, juicy, and sweet. Tree a strong grower, with rounded head. Leaves small, 3-lobed.

Barnissotte, White.—*White Barnissotte; Barnissou Blanc; Bourjassotte Blanche* (France); *Barnissotte Blanche; Brogiotto Bianco; Brogiotto Genovese* (Italy); *Bourgassotte; Bourgeassotte; Ficus grandis Sauvaigo.*—Second crop medium, roundish turbinate, a little longer than the Black Barnissotte: ribs distinct but few, neck very short, no stalk, obtuse at apex, with swollen cheeks; 2½ inches in diameter at the base; skin waxy, but not glossy, easily detaching from the pulp: color green, evenly diffused. Eye large, sunk and closed; scales large, unequal, of bright rose color, standing out. No iris. Pulp bright red, very sweet and honey-like, refreshing. First crop very rare, observed and described a few times only by Gallesio in 1816 and 1836. Earlier than the Black Barnissotte. Leaves 3-lobed, almost entire. One of the largest fig trees, said to have been introduced into Europe from Syria by the Genoese during the crusades. A most excellent fig for the table. France, Spain, and Italy, or generally distributed along the Mediterranean. There appear to be two forms of the fig, one much longer than the other. The variety described by Bernard is given a length of 1½ by 1½ inches. The name may be applied properly only to the short variety, which is only slightly longer than the Black Barnissotte. First crop requires caprification. (Figs. 39, 40.)

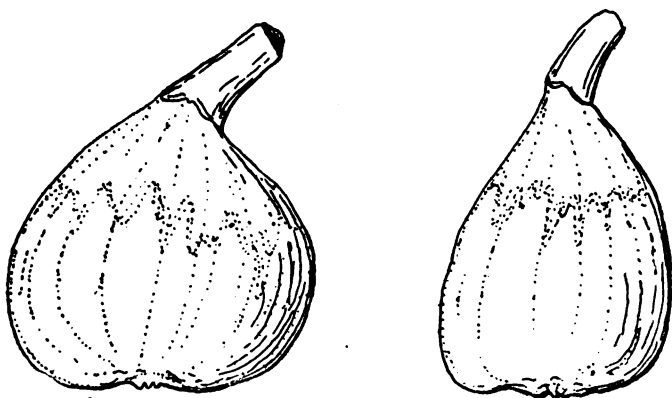


FIG. 38.—Barnissotte, Black fig.

Barnissou Blanc—BARNISSOTTE, WHITE.

Bartakjik—BARDAKJIK, BLACK.

Bartadjic—BARDAKJIK.

Bayswater—BRUNSWICK.

Beaucaire.—*Figure Grise; Grisette; Celestine; Grisette Hâtive; Gray fig.*—Two crops. First crop: Fruit large, pyriform; color of skin violet gray; pulp rose; quality good. Second crop: Smaller, of medium size, more oblong; color of skin ashy gray; pulp deep red; fine flavor. A fig valued in France for its earliness and fine flavor. It is different from CELESTE, which is a small fig and of a deeper bluish color. Entrecasteaux, France.

Bec de Perdrix.—Below medium, pyriform, with long neck. Ribs longitudinal, plain; stalk short, about one-eighth of an inch. Color of skin dark purple, darkest around the eye of crown, shading toward the stalk. Fine blue bloom on shaded side. Pulp sirupy, stiff, very dark rose. A good drying fig. Southern France and Spain. (Hogg.)

Bellegarde—BARNISSOTTE, BLACK.

Bellona.—Two crops. First crop is very light, large, 3½ inches long by 2½ wide; pyriform, violet gray or yellowish mixed with green; pulp pale red, very sweet. Second crop: Smaller, 2½ to 3 inches by 2½ inches, oblong-rounded but variable in form; widest at apex, which is flattened. Skin thin, cracking at maturity; eye elevated, of reddish color. Color of skin blackish violet mixed with green and red. Pulp red, very sweet; not very thick, but very fine. August to October. Tree wider than high, with large, drooping branches touching the soil, where they frequently take root. Leaves very large, 3 to 7

lobed, pointed, deeply crenated. Requires moist and rich soil: in dry soil the pulp becomes pale. Extensively grown in Provence, especially in the Alpes-Maritimes, where it is valued as the "Queen of figs." It is unsurpassed as a fresh fig, and is also of good quality when dry. A most valuable fig which can not be too highly recommended. In the vicinity of Nice *BELLONA* plays the same part as the *MARSEILLAISE* in Provence, as the *DOTTATO* in Toscana, as the *VERDONE* at Rome, as the *TROJANO* at Naples, or as the *LAMPEIRA* in Algarve, Portugal.

Berdauda—*GROSSE BEURDOUA*.

Bernade.—France and Italy.

Bernissenca—*Barnissenca* (Nice); *Barnissenque* (Provence); *Ficus garideli* Risso.—Below medium, about 1½ by 1¼ inches. Almost round, with a slender neck, lopsided. Skin thin, milky, adhering to the pulp. Color violet brown; pulp red, watery, slightly bitter; quality medium to fair; but valuable as a late fig. Leaves 3-lobed, with undulating margins, lobes rounded. Moist soils. One of the latest figs, sometimes ripening all through winter or early spring before the brebas. Nice and Provence.

Bernissenque—*VERNISSENQUE*.

Bertolina—*CAIANA*.

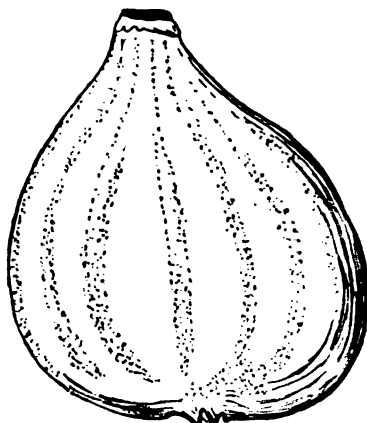


FIG. 39.—Barnissotte, White fig.



FIG. 40.—Leaf of Barnissotte, White fig.

Betada.—Small, rounded, inclining to oblate; skin black, shading off to paler toward the stalk, where it is decidedly greener. Eye closed, flat stalk short; pulp sirupy, pale rose. Rich and excellent. (Hogg.)

Bianca Morcati—Italy.

Blanchetta—ALBO.

Biancoletta—ALBO.

Biancolini—ALBO.

Biancotondo Grossissimo.—Largest size; white, for table. Possibly identical with GENTILE. Italy.

Biberaeao.—Size 3 by 1½ inches, oblong. Neck tapering, short; stalk short; skin smooth, rather waxy; few and indistinct ribs; eye closed. Scales reddish pink, small; meat white; pulp brown with a reddish flush; seeds small. Color dark bluish-black, with a dull bloom. Leaves medium, 3 to 5 lobed, lobes rather deep, with wavy margins; stalk long. Provence. Tree strong, with rounded head. Not identical with DOURO VEBRA, which is a much smaller fig.

Bifère Blanche.—Small, white table fig; good bearer, but medium quality. France.

Bifère de l'Archipel.—France. Not identical with DE L'ARCHIPEL.

Bifère de la Malmaison.—Size below medium; round, sometimes oblong, lopsided, one side of apex hanging down below the other; no ribs; stalks stout; skin pale brown streaked with purple, with thick gray bloom; eye closed; pulp tender, juicy, but not finely flavored, pale rose to red. A very rich fig.

Binelli—DOTTATO.

Binellino—DOTTATO.

Bitter Skin—AMAROUNA.

Black and White—BLANCHE ET NOIRE.

Black Bardakjik—BARDAKJIK, BLACK.

Black Barnissotte—BARNISSOTTE, BLACK.

Black Bourgassotte—BARNISSOTTE, BLACK.

Black California—MISSION.

Black Coucourelle—COUCOURELLE GAVOTTE.

Black Douro—DOURO, BLACK.

Black Ischia—ISCHIA, BLACK.

Black Marseillaise—MARSEILLAISE, BLACK.

Black Martinique—MARTINIQUE.

Black Mexican—MISSION.

Black Mission—MISSION.

Black Mussega—MUSSEGA NEGRA.

Black Naples—Given by Hogg as synonym of BRUNSWICK, which is probably not correct.

Black Pissalutto—PISSALUTTO NEGRO.

Black Provence—MARSEILLAISE, BLACK.

Black Rondella—RONDELLA NEGRA.

Black San Pedro—SAN PEDRO, BLACK.

Black Spanish—GENOA, BLACK.

Blancassa—*Ficus abida* Risso; *Ficus carica* var. *fodereana* Geny.—Two crops.

First crop: Subglobular; skin rough; color greenish white, flushed with yellow, 1½ to 2½ inches; pulp pale rose, shading to white. Second crop: Subpyriform, rounded, greenish yellow; larger than the first crop, 2½ by 1½ inches. Pulp red.

Blanche—*Blanche d'Argenteuil*; *Blanche Hâtive*; *d'Argenteuil*; *Grosse Blanche Ronde*; *Blanquo* (Provence).—Two crops. First crop: 2½ by 2½ inches long, round, slightly turbinate, flattened at apex; stalk short, no neck; ribs prominent; eye medium, open; color of skin greenish yellow; pulp amber white, with a few large seeds. Second crop: Fruit small, turbinate, flattened at apex, about 1½ inches diameter. Skin rough, with shallow, indistinct ribs. No neck and very short stalk. Eye small, flat, open or closed. Color of skin yellowish green, with white seams when ripe. Pulp amber white, with small seeds, very juicy, finely grained and sweet. No trace of pink. Tree moderately small. Leaves small, 3-lobed. Even the second crop, though smaller, is of a very fine quality. This fig does not seem to belong to the Marseillaise class. Extensively cultivated at Argenteuil for the Paris market. This fig is the oldest fig introduced to Argenteuil near Paris. It is said to have been brought there during the time of Julianus Apostata, the Roman Emperor. (Fig. 41.)

Blanche d'Argenteuil—BLANCHE.

Blanche d'Athènes—ATHÈNES.

Blanche de Toulouse—*White Toulouse*.—Large, oblong; very good. A white variety common around Toulouse, in France.

Blanche de Versailles—*White Versailles*.—Fruit small, white, and early. Grown in northern central France for the Paris market.

Blanche et Noire—*Black and white*.—A mottled fig, interesting on account of its color, but otherwise of no great importance.

Blanche Hâtive—**BLANCHE.**

Blanche Ronde—*Round white.*—Most varieties with such names as "Round White," "Long Black," "Long White," etc., refer in different localities to entirely distinct varieties. Such names should be discarded, as they serve to



FIG. 41.—Blanche fig—first crop.

confound the nomenclature without precisely indicating the variety and without the possibility of identifying the variety except by careful comparison or transplanting. Such varieties as a rule are also less valuable, as valuable figs are generally given different and distinct names.

Blanche Jaune.—Above medium, oblong, skin yellow, dotted white. France.

Blanchette—ROLANDINA.

Blanquette—LIPARI.

Blanquette—LIPARI.

Blanquette Grosse—A large variety of LIPARI.

Blanquo—BLANCHE.

Blavette—COTIGNANA.

Blowers. (See Smyrna figs, p. 278.)

Blower's Smyrna—BLOWERS.

Blue—BROWN TURKEY.

Blue Burgundy—BROWN TURKEY.

Blue Celeste—CELESTE.

Blue Ischia—ISCHIA, BLACK.

Bocarde.—Medium size; blackish brown; pulp, deep rose; very good. France.

Bodoni.—Large; two crops. France.

Bonafoux.—France.

Bondance Précoce.—Size below medium; $1\frac{1}{2}$ by $1\frac{1}{2}$ inches; round, uneven; neck distinct, but short; stalk none, or very short; ribs distinct, few, slightly elevated; eye small, sunk, with a very small but distinct opening, and a slightly raised iris; scales few, medium size, color rose; skin rough, hairy, color muddy amber brown, with a darker flush in the sun and yellowish-red in the shade; light bloom around stalk. Pulp rose, very sweet and juicy; meat, amber white, very fine quality. A darker fig than the Brunswick; leaves oblong, medium, about $8\frac{1}{2}$ by 5 inches. 3 to 5 lobed. (Fig. 42.)

Bonissotte Blanche—BOURDISOTTE, BLANCHE.

Bonne Dame.—A very early French fig.

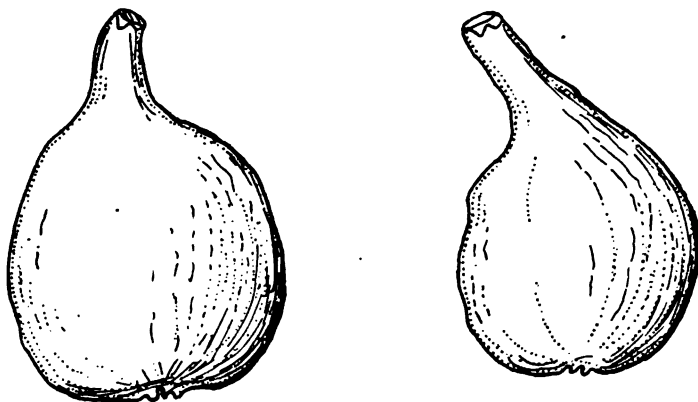


FIG. 42.—Bondance Précoce figs.

Bontard.—Size below medium; $1\frac{1}{2}$ by $1\frac{1}{2}$ inches long; neck short, tapering; stalk short; ribs few, but rather elevated, wavy, reaching the eye. Eyes small, depressed, open; scales few, large, amber; skin rather rough, yellowish-green with pale bloom. Pulp not fine, rosy pink; leaves above medium, 5-lobed, with only short spurs. Surface rough and coarse. Leaves longer than wide, the end lobe being the longest. The variety received from the Royal Horticultural Society differs a little from the above, and may be described as follows: Size medium, turbinate, about $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide, but with short, distinct neck, or none; stalk very short; ribs few and indistinct; skin downy, light yellow and green, with faint bloom; eye small, open or closed, with amber scales; no iris, flat. Pulp rose to amber, usually coarse and uneven, but sometimes fine amber, fine-grained; meat thin, white, juicy, and sweet, vinous but not rich; light green, without shade of other colors. Leaves small, wider than long, light green, 3-lobed, with short spurs. A good fig.

Bontalette—Bontillette.—A white drying fig. Brignoles, France.

Bontillette—BONTALETTE.

Bordeaux—*Petite Aubique*; *Petite Aubique Violette*; *Petite Figue Violette*, *Albicougris*; *Ficus erin*, var. *cinerescens* Geny; *Figue Poire*; *Fiquo Aubiquon*.—Two crops: Second crop best; above medium, about $3\frac{1}{2}$ by 2 inches. Pyriform, with very narrow neck and medium long stalk. Eye medium, raised, with red iris; skin not smooth, of a velvet brown color shading to ashy gray, spotted clear green on the neck, which is well set. Leaves 5 or 7 lobed, with long, narrow lobes, crenate, pointed. Requires moist ground, as it suffers from coulure (dropping) in dry soils. The Bordeaux is a very good fig, with two crops. Com-

mon around Bordeaux and Nagronne in southern France; generally confounded with Aubique, which is a much larger fig and synonymous with San Pedro. A distinction must be made between the *Petite Aubique* and the *Aubique*, the former being identical with our BORDEAUX, the latter with BLACK SAN PEDRO, which is synonymous with *Grosse Violette de Bordeaux*. (Fig. 48.)

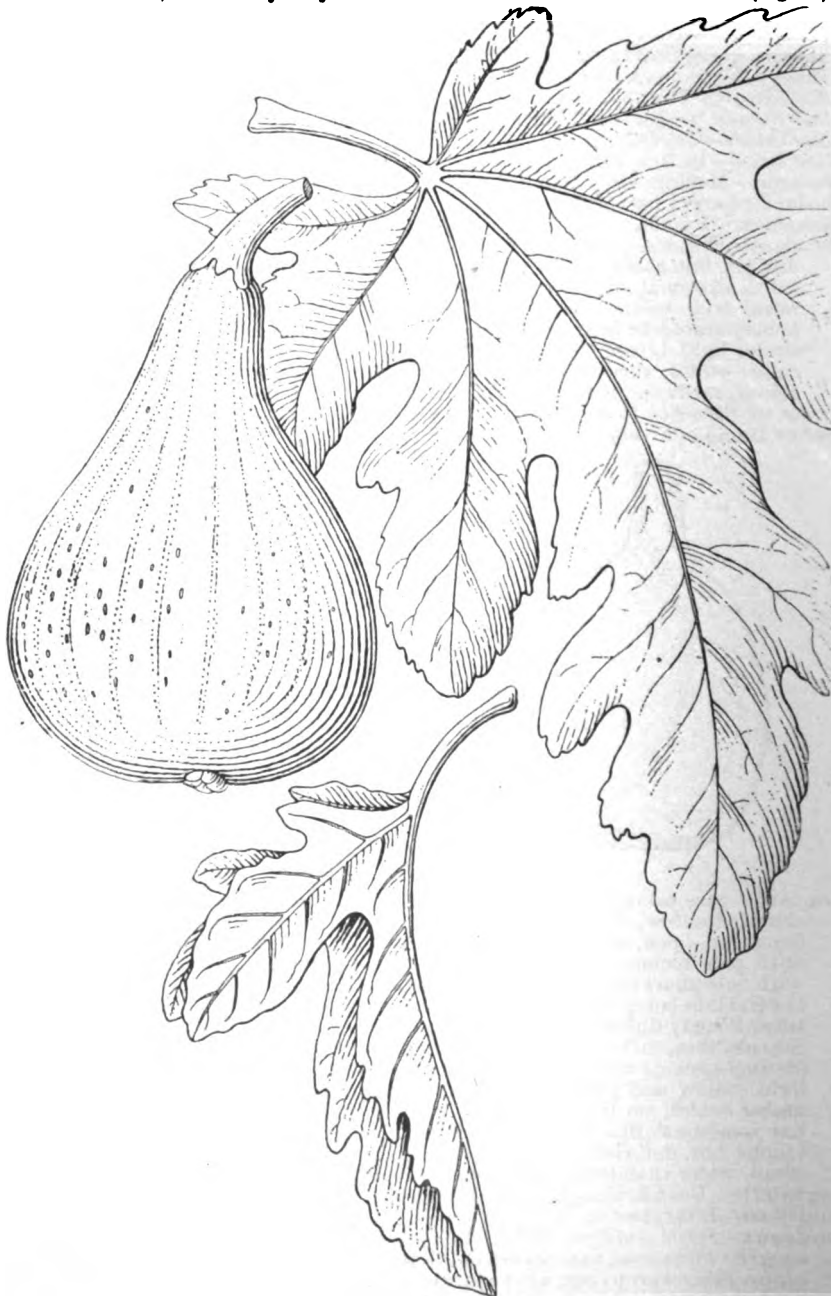


FIG. 43.—Bordeaux fig.

Bordeaux—SAN PEDRO, BLACK.
Bouche Barrique—TAPA CARTIN.

Boughton.—Synonym of *BRUNSWICK*, according to Barron.

Bouin.—*Bovin*; *Figa Bovin*; *Ficus bovina* Risso.—Above medium, $8\frac{1}{2}$ by $1\frac{1}{4}$ inches.

Shape oblong, twice as long as broad; broadest at apex. Skin adhering to the pulp, greenish yellow with a raised red eye, surrounded by a red star-shaped iris. Pulp bright red. A good fig. Nice and Provence.

Bouissonne.—*MOUISSOUNA*.

Bourdisotte Blanche.—*Bonissotte Blanche*.—Small, round, inclining to turbinate; stalk very short; ribs prominent; eye large and open; color of skin green or yellow when fully mature, with a delicate white bloom. Pulp pale rose, rich, and sweet. A good French drying fig.

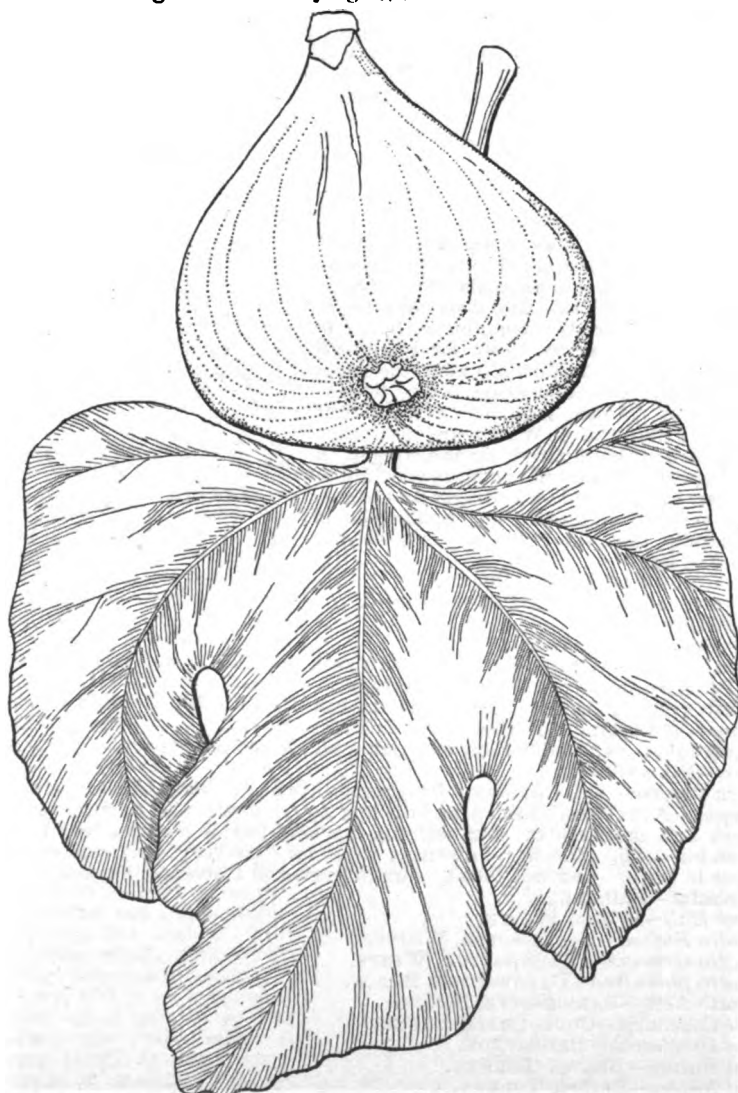


FIG. 44.—Bourdisotte Noire fig.

Bourdisotte Noire.—Medium, shape roundish turbinate; very short neck; stalk very short; ribs prominent, very even and regular; eye open, small, round; skin purple, with a thick, gray bloom. Pulp deep flesh-colored, with a thick vein of white nearest the skin. A sweet but not flavored fig (Hogg). The *Bourdisotte* must not be confounded with the *Burnissottes* or *Bourjassottes*. (Fig. 44.)

Bourdou—GOURAUD NOIRE.

Bourgassotte—BARNISSOTTE, WHITE.

Bourgeassotte—BARNISSOTTE, WHITE.

Bourjassotte Blanche—BARNISSOTTE, WHITE.

Bourjassotte Grise.—Size medium; roundish, flattened, almost oblate; skin dull brown or tawny, with patches of purple. Pulp deep red; very rich and luscious. The most constantly good fig grown in English hothouses, and a good cropper, according to Barron, who gives this fig as a different one from *Barnissotte Grise*.

Bourjassotte Noire—BARNISSOTTE, BLACK.

Bourraillese—GOURAUD NOIRE.

Boutana.—Size medium or above medium; pyriform to oblate, with an oblique axis. Stalk short, one-eighth inch long; ribs extending to apex; skin dull or tawny green, with no bloom, but downy. Pulp deep rose, but not dark. (Barron and Hogg.)

Boutilete.—For drying. At Brignoles.

Bouton du Guêtre—LIPARI.

Bovin—BOUIN.

Brayasque—BRIASCA.

Brayasque—BRIASCA DOUSSA.

Brebas.—*Brebas* is a Spanish name for any first crop of figs and is applied to figs of any size and color. It corresponds to "fiore," "figues fleures," etc., and does not refer to any certain variety, meaning early. The variety imported by Professor Pohndorff from Spain to California, under the name of "*Breba*," is the San Pedro White, which, as is well known, matures only the first crop. From Prof. E. W. Hilgard the author has learned that another fig is also sold in Malaga as *Brebas*, but the fig is very much larger, oblong, and exceedingly handsome, and yellow. In Mexico the popular idea is generally that the "*Breba*" is a special kind of fig.

Breba Negra—SAN PEDRO, BLACK.

Breba (erroneously)—SAN PEDRO, WHITE.

Brianchetta—ALBO.

Brianculetta (Porta)—ALBO.

Briasca (Nice)—*Brayasque* (Provence);

Ficus sylvestris var. *festinatissima* Geny.

First crop 2½ inches long by 1½ inches wide; pyriform, rounded, eye reddish, protruding; skin reddish-brown; pulp red.

Nice and Provence. (Fig. 45.)

Briasca—ROLANDINA.

Briasca Doussa—*Sweet Briasca*; *Brayasque*; *Ficus dulcissima* Risso; *Sweet Brayasque*.—Above medium; 2½ inches long by 1½ inches wide, with very short neck and short stalks; skin shining, blackish purple, shaded red; pulp reddish but pale. The figs, known as "buffros," are very early and sweet, but poor in taste. Leaves 3-lobed. Draguignan and Provence, France.

Brizanzola.—Italian fig.

Brocket Hall—ISCHIA, WHITE.

Brogiotto Bianco—BARNISSOTTE, WHITE.

Brogiotto Genovese—BARNISSOTTE, WHITE.

Brogiotto fiorentino—BARNISSOTTE, BLACK.

Brogiotto Nero—BARNISSOTTE, BLACK.

Brown Coucourel—COUCOURELE BRUNE.

Brown Hamburg—BRUNSWICK.

Brown Italian—BROWN TURKEY.

Brown Naples—BROWN TURKEY.

Brown Turkey—Ashridge ; *oring*; *Blue*; *Common Blue*; *Blue Burgundy*; *Brown Italian*; *Brown Naples*; *Long Naples*; *Early Howick*; *Italian*; *Large Blue*; *Lee's Perpetual*; *Murrey*; *Purple*; *Fleur Rouge*; *Walton*; *Turkey*; *Brown* (all synonyms according to Hogg).—Large size. Turbinate-pyriform with small but hardy distinct neck; stalks short or variable; fig flattened toward apex; ribs few, slightly elevated; eye medium, slightly open; scales large, rosy brown, all depressed; raised iris. Skin smooth, greenish in shade, violet brown in the sun, with darker ribs. Pulp dark rosy red, seed small, good quality. A

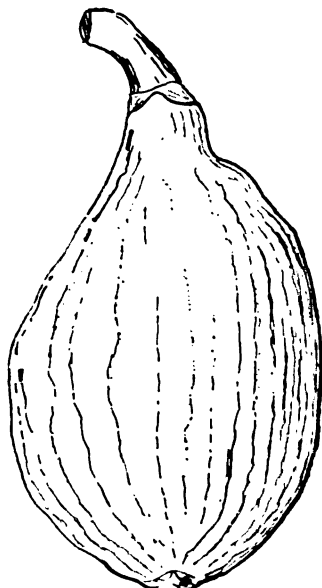


FIG. 45.—Briasca fig.

good bearer. The fig generally known as *Brown Turkey* in California, and elsewhere in America as the *BRUNSWICK*. (Figs. 46, 47.)

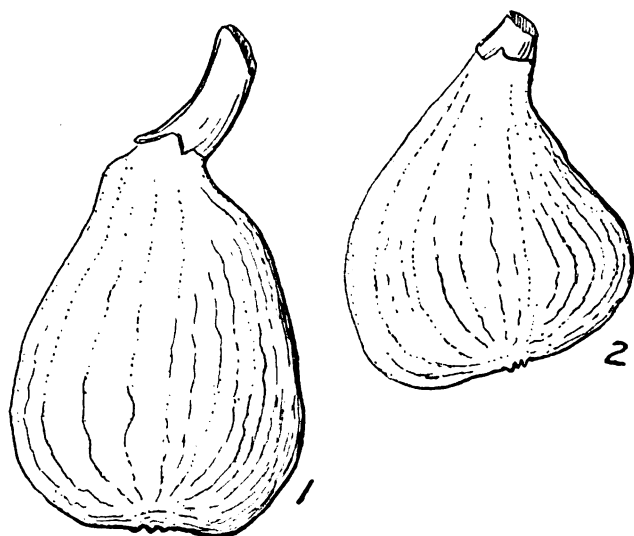


FIG. 46.—Brown Turkey figs.

Brunswick—*Bayswater*; *Bough ton*; *Brown Hamburg*; *Clementine*; *De St. Jean*; *Hanover*; *Madonna*; *Red*; *Large White Turkey*; *Black Naples* (?).—All these

are given by Dr. Hogg. Two crops. First crop very large, pyriform, rather cylindrical, with swollen cheeks, one of which is the larger; apex very obtuse, neck and stalk very short; ribs distinct, but not much elevated, few and broad. Eye medium, hardly elevated, open; iris slightly darker, with amber-rose scales. Skin pale amber with a violet tint; ribs darker violet, shading reddish; the shady side paler amber, toward stalk and neck greenish yellow; skin smooth, but not waxy; pulp amber. Second crop medium or below, otherwise not much different from the brebas. Tree is quite small, with straggling branches, deeply cut leaves, which on account of their small number as well as size give little shade. A very hardy fig, with large crops of medium quality. This fig, which is variously and erroneously known in California and in the United

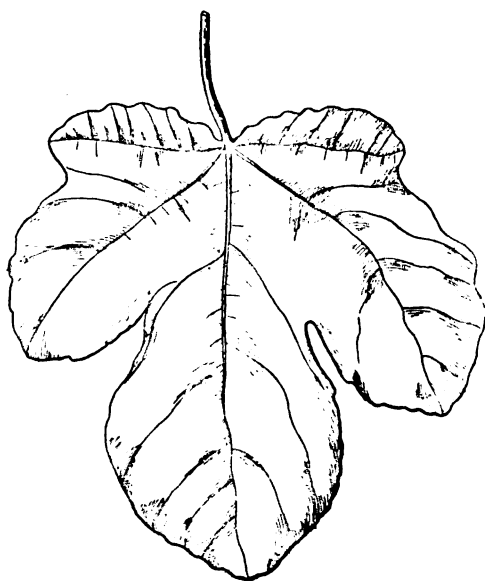


FIG. 47.—Leaf of Brown Turkey fig.

States generally as *Brown Turkey*, *Smyrna*, etc., was, until the introduction of the *ADRIATIC*, the most common white fig in the first-mentioned State. The very large dingy white and brown Brebas are the first figs in the San Francisco market, but they are watery, not sweet, and otherwise poor in quality, although very juicy. (Fig. 48.)

Bucuelle—France.

Bulletin Black—PURPLE SMYRNA. (See Smyrna figs. p. 279.)

Bulletin Smyrna—LOB INGI.—Under this name four distinct varieties imported from Smyrna have been distributed by G. P. Rixford, of the San Francisco Evening Bulletin. For a history of these figs see "Early fig culture in California." It was soon found that the figs dropped regularly before maturity, and up to the year 1891 not a single fig had matured. That year some 30 figs were pollinated by Mr. E. W. Maslin and the author, all apparently arriving at full and perfect maturity, thus proving the value of the figs and their genuineness. Previous to this, however, most of the fig trees distributed had been destroyed as unproductive. (See Smyrna figs. p. 278.)

Burnham's Smyrna—ATHÈNES.

Cabroliana—La Douqueiretta; *Ficus carica* var. *flamantiana* Geny.—Second crop pyriform, greenish yellow. $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide. Pulp red. Nice and Provence.

Caiana—Bertolina, Eze; *Ficus caiana* Risso; *Ficus browni* Risso; *Ficus sylvestris* var. *africana* Geny; *Red Caiana*.—Small. $1\frac{1}{2}$ inches diameter; turbinate; skin thin, downy, reddish violet, or violet red with a blue bloom. Pulp pale red, watery, somewhat bitter. Nice and Provence.

Caiana Blanca—Ficus candelana Risso.—Similar to the preceding, but with greenish-yellow skin. Nice and Provence.

Calabresa—Ficus sylvestris var. *calabra* Geny.—First crop above medium or large, about 3 inches long by $2\frac{1}{2}$ wide; pyriform; of a bright green, mixed with brown. Meat violet; pulp red. Nice and its vicinity.

Calabria—DOTTATO.

California—MISSION.

Caprifig—Carisfiguier; Doukkar (Kabylia); *Wild Fig*.—The wild fig of the Mediterranean region, with male, gall, and female flowers in the same fig, for all of which see special chapter (p. 74). There are a great number of varieties of this fig, differing in shape, size, and color of the fruit, as well as in the shape of the leaves, which in some are almost entire, in others very deeply lobed. Some varieties bear three crops a year, others two, and some only one crop. The varieties are suited to different localities. The caprifig is indigenous to southern Arabia, but has become wild in all Mediterranean districts, even in southern France. (Fig. 49.) For description of named varieties of caprifigs see p. 279.

Caravanchina Bianca—CARAVANCHINA.

Caravanchina Blanca—CARAVANCHINA.

Caravanchina—Caravanchina Bianca; Caravanchina Blanca; Ficus sylvestris var. *sublittoralis* Geny; *Ficus collina* Risso.—Two crops: First crop above medium; $3\frac{1}{2}$ inches long by 2 wide; pyriform, with long neck, heartshaped at apex. Eye prominent, reddish; skin greenish yellow; pulp red, white, and violet, with a violet inner skin. Second crop $1\frac{1}{2}$ inches in diameter, turbinate, almost rounded; of a greenish yellow mixed with red. A good table fig. Nice and Provence.

Caravanchina Negra—Caravanquin Negre; Fico ovata; Ovato; Ficus obovata Risso; *Ficus sylvestris* var. *obovata* Geny.—Second crop: oval-oblong, $1\frac{1}{2}$ to 2 inches diameter; skin rough, shiny, blackish violet; pulp red. Italy and Provence.

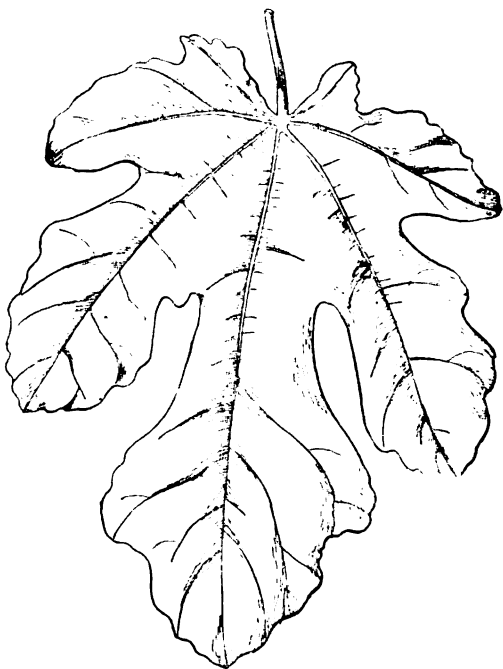


FIG. 48. — Leaf of Brunswick fig.

Caravanquin Negre—CARAVANCHINA NEGRA.

Carbiani.—Table fig. Italy.

Carisfiguier—CAPRIFIG. (See p. 279.)

Castagnola—*La Castagnola*; *Castagnolo* (Italy): *Ficus carica* var. *fucosa* Geny.—Globular; bright green; $1\frac{1}{4}$ to $1\frac{1}{2}$ inches diameter. Savoy, at Nice.

Castagnolo—CASTAGNOLA.

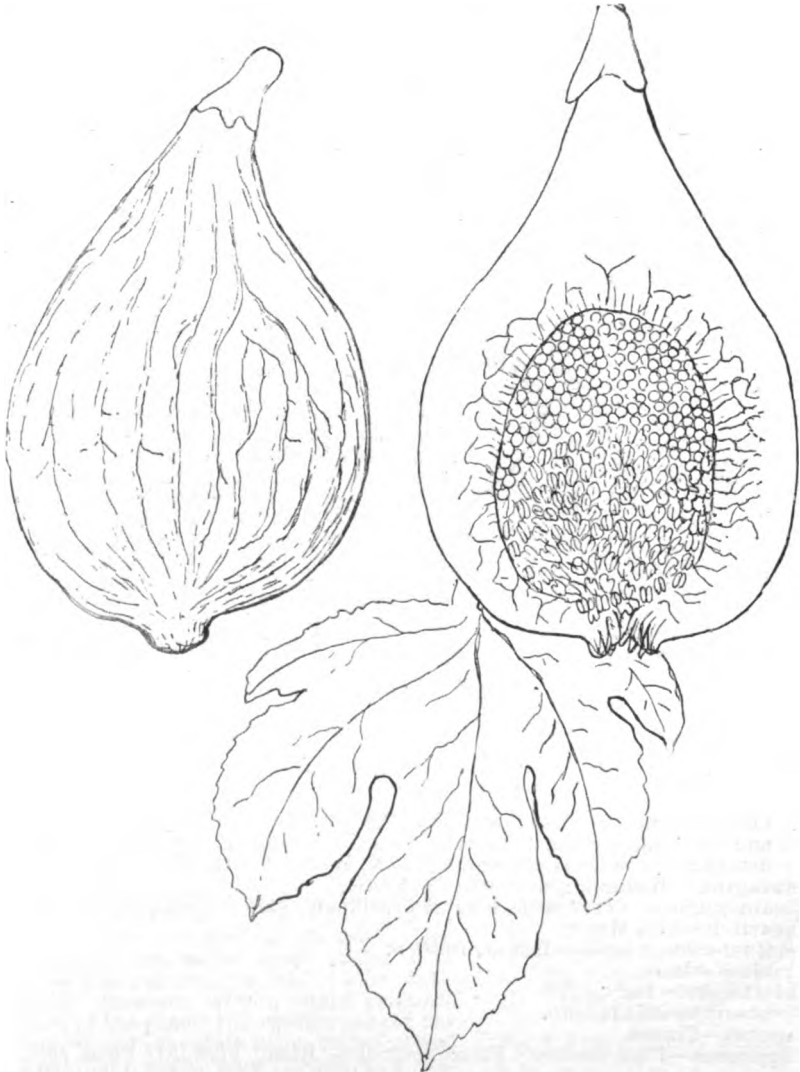


FIG. 49.—Caprifig from Italy.

Castle Kennedy.—Fruit very large, obovate or long pyriform; skin thin, very tender, greenish yellow on the neck and toward the stalk, but pale dingy brown, mottled with dull, dingy gray on the widest part and toward the eye; pulp pale, opaline, with slight stains of red around some of the seeds nearest the eye; tender, but not richly flavored. A large and handsome early fig, remarkable for its earliness, which is nearly three weeks ahead of the *Marseillaise*. The fruit greatly resembles *Brunswick*, but is entirely distinct in habit and growth of plant; abundant bearer; has been grown for more than a century at Castle Kennedy, N. B., England. (Hogg.)

Cassaba—KASSABA.—(See Smyrna figs, p. 278).

Catalan—*Ficus gallica* Risso.—Rounded, flat, bright violet; pulp red. Nice and the Riviera.

Cavajolo.—Italy.

Cavaliere.—Italy.

Celeste.—*Blue Celeste*; *Celestial*; *Celeste Violette*.—Small, $1\frac{1}{2}$ by $1\frac{1}{4}$ inches. Ovate-turbinate, with long and distinct neck; ribs few but distinct on body and around the apex, but not on neck; stalk variable, but always long—sometimes half as long as the body of the fig; eye raised, rough, closed with very small scales and elevated iris of the same color as the skin of the fig; color dark violet brownish amber, without any reddish flush, slightly paler toward the apex. The bloom, which is confined to the neck and upper part of the body, is bounded by a distinct and sharp line, and is thick and pale blue; skin very thin; pulp dark rose, fine grained; meat amber; sweet, but of poor flavor; tree a strong grower, erect, leaves medium to small, 3 to 5 lobed. (Fig. 50.)

Celeste Violette—CELESTE.

Celestial—CELESTE.

Celestine—BEAUCAIRE.

Cernica.—Medium, roundish turbinate; ribs shallow, but distinct; neck and stalk combined one-third the length of the fig; skin blackish violet, with blue bloom,

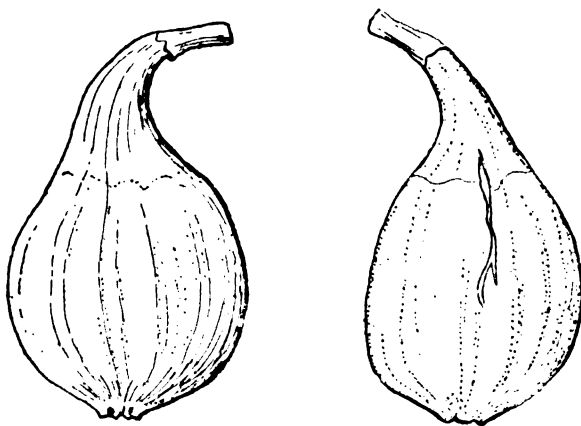


FIG. 50.—Celeste figs.

not very thin; eye closed, with exuding honey when ripe; pulp deep red, oily, and sweet, but lacking in flavor; a black Dalmatian fig, Cernica meaning black; first introduced into California by G. N. Milco. Resembles Black Barnissotte.

Charagine.—Medium, round, white. France.

Cheameghouar.—Very large, long and turbinate; skin red, pulp white. Algiers.

Chearlick—Asia Minor.

Chestnut-colored Ischia—ISCHIA, BROWN.

Chiajese.—Italy.

Chiattolatte.—Italy.

Christmas fig—NATALINO.

Cierotat.—France.

Cimeirenca—*Figa verdara*; *Ficus cemenalea*, Risso; *Verdara*; *Ficus erin*, var. *cemenalea* Geny.—About 2 to $2\frac{1}{2}$ inches diameter, turbinate; skin thick, violet black; eye red; pulp purple; good, very productive. Originated near Cimiez in France according to Dr. Sauvaigo. There is said to be a *Cimeirenca blanca* at Nice, France.

Clare—*Doctor Hogg's Clare*.—Said to be a synonym of Brunswick. The fig sent in by the Royal Horticultural Society of London is a different fig. It is small, roundish, with no neck. Eye very large, splitting wide open. Skin smooth yellowish green, working in every direction. No ribs; pulp rosy, very pale, juicy; seeds very small; sweet, but no flavor. Leaves 8 inches long by 7 wide, 3-lobed, medium deep, sometimes two additional upper lobes.

Claveu—*Clou*; *Figa clou*; *Ficus clavicularis* Risso; *Ficus erin.* var. *longicaulis* Geny.—Two crops. First crop, large, $3\frac{1}{2}$ to 4 inches by $1\frac{1}{2}$ to $1\frac{1}{2}$ wide, pyriform, but very oblong, eye protruding, skin thin, of a uniform brownish black, pulp carmine red mixed with violet. Second crop: Turbinate, of about $2\frac{1}{2}$ inches diameter. Nice and Provence.

Clou—CLAVEU.

Clementine—BRUNSWICK.

Cloverdale.—Small, about $1\frac{1}{4}$ to $1\frac{1}{2}$ inches; round pyriform, with a thin and distinct neck, broadest below the center towards the apex. Stalk medium, with large leaflets; ribs few, but well marked from and on the stalk, gradually disappearing on the body of the fig. Eye smooth, not sunk; scales large, rosy red, iris small or none; skin very smooth, greenish yellow, color evenly diffused. Pulp fine grained, red; meat white. The real name is unknown. Received from Mr. Truett of Cloverdale, Cal.

Coasco—ROLANDINA.

Cœur—CUERS.

Cœur des Dames—CUERS.

Col de Señora Negra—COL DI SIGNORA NIGRA.

Col de Signora—COL DI SIGNORA BIANCA.

Col de Signora Bianca Panachée—COL DI SIGNORA PANACHÉE.

Col des Dames—COL DI SIGNORA BIANCA.

Col di Signora Bianca—*Coldes Dames*; *Coull de Dama*; *Col de Signora*; *Lucrezia*; *Ficus domina* Risso; *Ficus carica* var. *carcosa* Geny.—Two crops. First crop: Rare, glaucous green-shaded yellow.

Second crop: Medium, about $1\frac{1}{2}$ by 3 inches, widest diameter near the apex. Shape oblong, pyriform, with a very long, well-set, and narrow neck, rather twisted and bent; stalk very short and stout; apex obtuse; ribs longitudinal, regular, and very prominent; eye closed, with red scales; color, greenish yellow, changing to greenish white, with a fine gray bloom. Skin thin, but hard, detaching itself from the pulp, which is very dark red, thick, and sirupy. Ripens very late—September to frost. The bearing qualities of this fig tree are poor, but the quality of the fig is very superior, it being one of the finest of figs, both fresh and dry, worthy of cultivation in any country. Widely distributed along the Mediterranean.

Col di Signora Nigra—*Col de Señora Negra*.—Medium size, $2\frac{1}{2}$ inches by $1\frac{1}{4}$ inches. Shape ovate pyriform, obtuse at apex; neck very narrow and long, curved and swollen towards the stalk end. Stalk very short, almost none, but thick. Ribs of two kinds: some are very large and prominent, others are much lower and shorter, but distinct even on the neck and on the stalk. Eye small, slightly raised, open; scales dark with pale margins, no iris. Color, dark violet chocolate, with a slight greenish flush in the shade, the swollen part of the neck close to the stalk being bluish-green. Apex dark violet brown, with here and there a flush of bright bluish green. Bloom thick, bluish white. Pulp very dark blood red, of exquisite flavor and sweetness, a perfect conserve; meat greenish yellow. Tree large, spreading; bark of tree dark, rough, not shiny; leaves large, 3 to 5 lobed, glossy, entire, but somewhat variable. Extensively cultivated near Roussillon, in France, and is there one of the latest figs. First crop very small, second crop larger; ripens from September to frost. One of the best figs, even superior to the white Col di Signora, but, like all figs, it thrives and comes to perfection only in certain localities. (Fig. 51.)

Col di Signora Panachée—*Col de Signora Bianca Panachée*; *Panachée*; *Striped Signora*.—Fruit above medium, shape roundish turbinate, even, regular in form, and very handsome in appearance. Neck shorter than the typical variety;

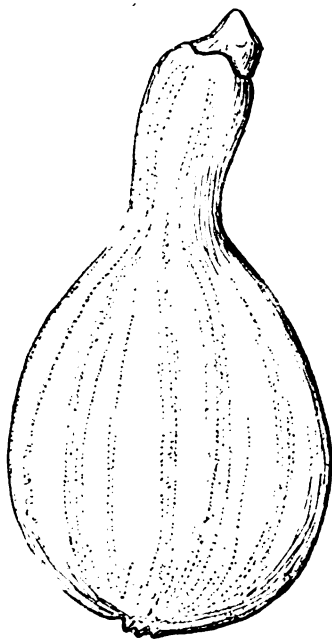


FIG. 51.—Col di Signora Nigra fig.

stalk about one-fourth inch long; color of skin, straw yellow, beautifully striped with longitudinal bands of bright, lively green, some of which are broad, others narrow. Eye closed, surrounded by a narrow iris; pulp bright rose, very sweet and delicious. This fig is similar in quality to the white Col, but with shorter neck and a distinct variegated skin and paler-colored pulp. It is not an extensively cultivated fig, on account of inferior bearing qualities, but for a garden fig it is much to be recommended, as it would sell well in any market. This fig is, however, inferior to the black Signora.

Colombro—Italy.

Comadre.—*Fico da Comadre*.—The best white-drying fig in Portugal, grown in Algarve, on the north shore of the Mediterranean.

Commercial Smyrna—LOB INGR.

Common Blue—BROWN TURKEY.

Concordana.—Possibly identical with *Congourdane*—MUSSEGA.

Constant Date—DATTE QUOTIDIENNE.

Constantine—*De Constantine*.—From the Chiswick Garden, Royal Horticultural Society. Medium to small. Turbinate, 2 inches long by $1\frac{1}{4}$ inches wide. Neck short and thin. Stalk very short. Many irregular ribs. Flat at apex. Eye small; open, with a brown iris. Color of skin, deep olive green, with violet ribs. Pulp dense, but with hollow center, of deep rose color. Tree straggling and spreading. Leaves medium, 3-lobed. (Fig. 52.)

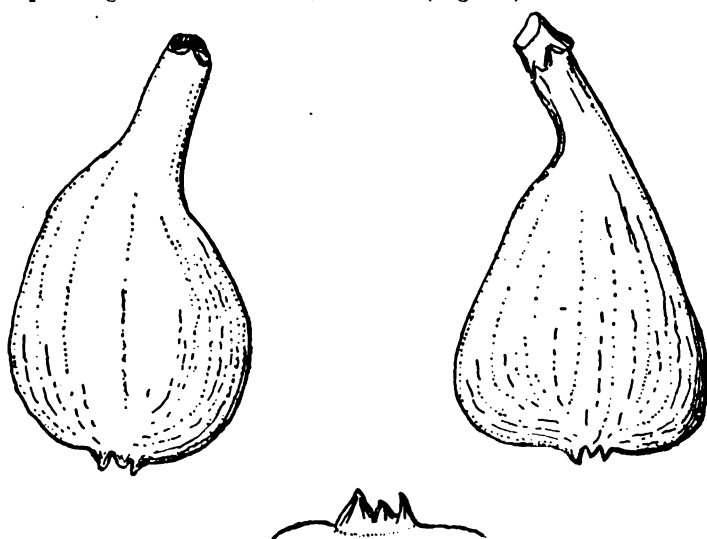


FIG. 52.—Constantine figs.

Corbo—SAN PEDRO, BLACK.

Cordelia.—Large, about $2\frac{1}{2}$ inches long by 2 inches wide; pyriform, with the greatest diameter near the eye, where the fig is slightly flattened. Neck very short. Stalk short. Ribs coarse, but few, fading out towards the stalk. Eye very prominent, with large scales, all sunk below the cheeks. Skin yellowish, with green shade. Eye pinkish or yellow, with a darker zone around the seeds; variable. Meat and pulp amber. A large zone below the eye contains numerous male flowers of perfect development, with much pollen when ripe. The lower zone contains only mule or gall flowers. This fig was found in the San Francisco market in August, 1893, where it had been brought from Cordelia, Cal. Exact location unknown to the author. The fig is very juicy, sweet, and pulpy; but the male zone is, as usual, very dry. The fig is one of the sweeter kinds, but devoid of flavor. The characteristic male flowers of this fig place it close to the Croisic fig, as described by Professor Solms-Laubach.

Cordelière—COTIGNANA.

Cordelière—SERVANTINE.

Cortese—ROLANDINA.

Cortice Crasso—PELOUA.

Cotignana—*Observantine*; *Observantière Grise*; *Cordelière*; *Figue Grise*; *Ficus cotignana* Risso; *Ficus sylvestris* var. *praecox* Geny; *Blavette*; *Barbillanne*.—Two crops. Brebas above medium, 3 to $3\frac{1}{2}$ inches by $2\frac{1}{2}$. Pyriform, flattened,

and larger at apex, suddenly contracted at the base, with a long neck with prominent veins. Color gray, tinted lilac. Skin thick, but tender. Cracking eye, large, reddish, surrounded by a bluish iris. Pulp pale red and yellow, very sweet, and fine (June and July). These brebas are of the very best quality, and the highest-priced early fig in southern France. Second crop, in September and October, is very inferior in quality as fresh, but superior for drying. Size smaller, and of pale color. Leaves, 5-lobed. The tree requires moist, deep, and rich soil.

Cotignacenque.—About 2 inches long by 1 inch wide; oblong, with long neck, flattened at apex. Skin greenish white. Eye red. Pulp red. Leaves 3-lobed; lobes pointed. Requires dry soils, and is not affected by rain. A good fig, fresh and dry, and it dries well on the branches of the tree. Provençe and Cotignac and other places in southern France. Not the same as *Cotignana*.

Coucoulletta—COUCOURELA.

Coucoureda—*Coucoulletta*; *Coucoureda de Grasse*; *Ficus tournefortiana* Risso; *Ficus erinacea* var. *asperima* Geny.—Two crops. Second crop: Medium, 2½ inches long, oblong pyriform; skin thin; color greenish yellow, mixed with reddish; pulp red, sweet, with almost no seed. For drying almost as good as the *Rolandina*. Leaves very deeply lobed, the middle lobe being very long. Common around Grasse, in Provençe, France.

Coucoureda Brune—*Brown Coucoureda*; *Coucoureda Brune* (Melette); *Ficus fusca* Risso; *Coucouredos Brunos* (Provençe).—Two crops. First crop: largest, 1½ by 1½ inches; very early. Second crop: Small or medium, roundish; color of skin deep brown, with a thick blue bloom; stalk variable in size; pulp tender, without flavor, of deep red color, shading to rose. Except for want of flavor it is a rich fig. Requires dry soils. Common in Provençe.

Coucoureda Brune—COUCOURELE BRUNE.

Coucoureda de Grasse—COUCOURELA.

Coucoureda Gavotte—*Coucoureda Noire*; *Black Coucoureda*; *Ficus labillardiera* Risso. Two crops. Medium to small, round, with dark longitudinal lines which are hardly elevated. No neck; eye open; skin deep purplish black over the apex and where fully exposed to sun, shading to paler, or even to greenish bronze in shade; blue bloom; pulp dark blood red, richly flavored. A first-rate fig.

Coucoureda Noire—COUCOURELE GAVOTTE.

Cou de Muelo—ROSE NOIRE.

Cougourdane—MUSSEGA.

Cougourdane.—Aix and Saint Remi.

Cougourdane—MUSSEGA.

Coull de Dama—COL DI SIGNORA BIANCA.

Coucoureda Blanche—ANGÉLIQUE.

Coucouredos Brunos—COUCOURELE BRUNE.

Cravé.—Size medium to small, 2½ by 1½ inches; oblong; neck long; stalk short, tapering; skin rough, with close, distinct ribs; neck is bent; eye closed, elevated, with sunk scales; cheeks protruding; widest diameter just above the eye or near apex; color violet black, with gray bloom; pulp fine, deep violet red. A sweet, juicy fig, without flavor or aroma. Leaves large, broad, lopsided (deeply), the lobes spreading and serrated, 5-lobed, average diameter. Italy and France.

Crovère—Provençe.

Cuers—*Des Dames*; *Verte*; *Trompe-Cassairè*; *Trompe-Chasseur* (Provençe); *Cœur des Dames*; *Lady Heart*; *Cœur*.—About 1½ inches wide by 2 inches long; neck small, distinct; stalk long; eye prominent, elevated, open; ribs low; skin green, turning violet; pulp red; leaves 5-lobed, crenated, lobes pointed. Requires moist soils. One of the best figs of Provençe. On account of its color this fig appears unripe when perfectly ripe, hence the name *Trompe-Chasseur*—hunters' deception. There is another fig known also in France as *Trompe Chasseur* on account of its deceptive color.

Cuore—RUBADO.

D'Abondance—FRANCHE PAILLARD.

Dalmatia—*Figue de Dalmatia* (Paul); *De Dalmatie*.—Very large, long, pyriform; skin pale green, covered with soft pubescence; flesh dull red, sweet and rich. (All according to Barron.) Is different from the fig known as "White Dalmatian" in California, which latter name was invented in this country, though the fig itself was introduced from Dalmatia.

Dalmatian—RAGUSA.

Dalmatian Ragusaine—RAGUSA.

Danina—Italy.

Date—DATTE QUOTIDIENNE.

Date-Quotidienne—DATTE QUOTIDIENNE.

Datte.—Medium or above; 2½ inches long by 1½ inches wide, generally lopsided, tapering. Neck distinct, slightly bent. Stalk very short. The longest diameter seldom passes through the eye. Skin waxy, smooth, with indistinct narrow ribs. Eye very small, closed with yellowish scales; skin very thin, pale green, with small oblong lighter dots. Pulp very fine, thick sirupy and rich, of a deep brownish salmon, perfectly solid. A most delicious, sweet fig. Tree medium; leaves small to medium, the larger ones about 7 inches long, with distinct lobes, the central one generally being the longest. This fig differs from DOTTATO and from DATTE QUOTIDIENNE. It is a much finer, though smaller, fig than the latter.

Datte Quotidienne.—*Date; Dattes?; Figue Datte? Date-Quotidienne; Quotidienne; Constant Date.*—Medium to large, 2½ inches long by 1½ inches wide; pyriform; no neck, or one very short and thick. Stalk very short; a few shallow, longitudinal ribs; eye closed, depressed, small; skin smooth, except for the ribs. Color violet brown on the ribs and on the sunny side, otherwise changing to green, especially around the stalk end. A rich violet bloom around the stalk end, which ends in the equatorial line. Pulp thick, oily, dark brownish rose. Tree moderate grower. Leaves medium to large, 5 lobed. A very fine fig for drying, especially at Salon and Eyquières, France.

Dattaresi.—DOTTATO.

Dattero.—DOTTATO.

Dattes?—DATTE QUOTIDIENNE.

Dattrali.—DOTTATO.

Dauphine.—*Dauphine Violette; d'Argenteuil; Argenteuil; Grosse Violette.*—First crop: Very large; round turbinate; stalk very short; color of skin purple, with thick blue bloom; pulp amber. Second crop: Smaller; about 2 inches long by 1½ inches wide. Grown extensively around Argenteuil for the Paris market. The most successfully cultivated dark fig for out-of-door culture in northern latitudes. It keeps long and transports more readily to distant localities than almost any other fig. Tree strong grower; leaves small, 3-lobed.

Dauphine Violette.—DAUPHINE.

Daurada.—*Ficus lutea* Risso; *Ficus carica* var. *chrysocarpa* Geny.—Below medium, 1½ to 1¾ inches long; globular, flattened at apex, color bright greenish yellow, pulp red. Savoy, around Nice. This fig differs from the *Figue d'or* or *Dorée* of Provence and also from the Italian *Dorato*, for which see *Albo*.

D'Abondance.—FRANCHE POILLARD.

D'Argenteuil.—BLANCHE.

D'Argenteuil.—DAUPHINE.

D'Athènes.—ATHÈNES.

De Bellegarde.—BARNISSOTTE, BLACK.

De Constantine.—Small, about 1½ inches each way; turbinate; small, straight neck; very short stalk, distinct, regular, but few ribs from stalk to apex. Eye medium, closed, with large scales, violet-brown iris, not elevated; skin rugose, of a dingy green color, dingy violet on sunny side and near stalk end. Bloom distinct, confined to a narrow zone around the stalk and occupying about one-fourth of the fig. Pulp dingy salmon, fine grained, rich and high flavored. Leaves medium, about 7 inches, 3 to 5 lobed, glossy, with small spurs, crenate. The fig from which this description is taken was received from the Royal Horticultural Society of London through Rev. Dr. Wilkes. The fig differs from a variety received from English nurserymen under the same name, and which is referred to in another place as *Constantine*.

De Constantine.—CONSTANTINE.

De Dalmatic.—DALMATIA.

D'Espagne.—ESPAGNOLA.

D'Eyrogue.—EYROGUE.

De Grasse.—MATARASSA.

De Jerusalem.—JERUSALEM.

De l'Archipel.—ARCHIPEL.

De la Frette.—VIOLETTE DE LA FRETTE.

De la Madeleine.—MADELEINE.

De la Madeleine.—MAGDALEN.

Delamater's.—ADRIATIC.

Del Giappone.—HIRTA.

De Lipari.—LIPARI.

Della Cava.—NATALINO.

Della Goccia d'Oro.—DOTTATO.

Della Toccia.—Italy.

De Nibran.—NIBRAN.

De Porto.—PORTO.

- De Saint Esprit.**—First crop fresh; end of June. At Marseilles, Aix, and Salon.
- De Saint Jean*—BRUNSWICK.
- De Saint Jean*—SAINT JEAN.
- Des Dames*—CUERS.
- Di Gerusalemme*—JERUSALEM.
- Doctor Hogg Black.**—Medium; oblong, obovate; neck very short or wanting; stalk very short and thick; eye small, closed; skin slightly hairy and of dark mulberry color, covered with thick blue bloom and numerous little white specks on the surface, which is furrowed by longitudinal lines. Pulp dull red, thick, and sirupy, very richly flavored. First found by Dr. Hogg near Toulouse, in France. The native name is not known. (Hogg.)
- Doctor Hogg's Clare*—CLARE.
- Doctor Kimball's White*—GENTILE.
- Domestica**—*Figa domestica* (Provence); *Ficus sylvestris* var. *tragus* Geny.—Pyriform; greenish yellow, pulp bright red. Nice and Provence.
- Dominique**—*Saint Dominique*.—A violet-colored French fig.
- D'Or Bifère.**—Small, or below medium, long ovate; color dull brown and greenish yellow; flesh blood red; very rich and juicy. (Barron.)
- D'Or de Beaum.**—Medium; oblong; distinct ribs; stalk short, very stout; eye open; skin pale hazel brown, on shaded side green, yellowish at full maturity. Pulp rosy toward eye, opaline toward stalk end; quality good or excellent. (Hogg.)
- D'Or de Laura.**—Below medium; oblong, with obscure ribs; eye closed; skin green, turning yellowish or dirty white when fully ripe. Pulp opaline, very sweet and tender. An excellent fig.
- Dorée**—*Figue d'Or*.—Two crops. Medium; oblong; color bright yellow; pulp salmon rose. The first crop is inferior, but very abundant. Fruit very large, irregular, clear yellowish brown. Second crop: Medium or below medium; turbinate, with flattened apex; about 2 inches long by 1½ inches wide. Ribs many, narrow, and shallow, but still distinct. Neck tapering from near the apex. Stalk very short. Color of skin pale, yellowish green, with fine gray bloom extending down to the widest part of the fig. Color very transparent and waxy. Not shining, but slightly downy. Eye small, depressed, open, with large scales. Pulp clear amber, with rosy flush, and large seeds. Meat greenish white. A fine, juicy fig of good quality. Small, but handsome. Tree moderately large, erect. Leaves small, 3-lobed.
- Dorée Nobis**—(spelling doubtful); *Dorée Norbus* (spelling doubtful).—Fruit medium or above about 2 inches long by 1½ wide; pyriform, the widest part above the eye. Ribs many, close, and shallow. No distinct neck, but with slight shoulders at the stalk, which latter is short. Skin waxy and beautifully transparent, of a light greenish-yellow color, more green around the apex. Eye small, closed frequently, with large raised iris. Pulp clear amber white; very fine grain. Meat thick; white. Seed small. Center often hollow. Tree strong, erect, with leaves large, drooping, with shallow 3 to 5 lobes. A very handsome fig, of good quality. Does not belong to the Marseillaise class. This fig is very similar to Dorée, but differs slightly in the color of the pulp. (Fig. 53.)
- Dorée Norbus**—DORÉE NOBIS.
- Dottati**—DOTTATO.
- Dottato**—*Calabria; Dattaresi; Dattero; Dottati* (Sargana); *Binellino* (Spezia and Chiavari); *Bnelli* and *Fichi di Napoli* (at Genoa); *Gentile; Gentili* (at Voltri); *Napolitani* (at Finali); *Fichi de Calabria* and *Dattali* (in western Liguria); *Gentile di Napoli* (Novi in Appennino, Liguria); *Goccia; Fico Della Goccia* and *Della Goccia d'Oro* (in Lombardy).—Size medium or above medium, 2½ by 3 inches or less. Shape ovate, pyriform, with the greatest diameter through the center. Neck medium, very well set and shouldered (especially in the first crop). Stalk very short or none; ribs low; skin smooth when fully ripe; shaded ribs; eye medium, closed or semiopen; scales small, pink colored. Skin thin, bursting, yellowish green amber, sometimes with violet flush. First crop very few figs, 1 or 2 dozen to the tree. Second crop abundant; leaves broad, round, 3 lobed. Tree a heavy grower and fine bearer. One of the very best figs, suitable for drying. The Dottato is the best-known fig in Toscana, and from there extends to southern Italy, and is the most valuable fig for drying there. The largest part of Italian exported dried figs is of this variety, and better than the Bourgasotte. The Dottato loves rich and moist soils and is not suitable for dry lands. Galleio supposes the Dottato to be identical with the Smyrna varieties, which is a mistake; neither is it identical with the Datte as grown around Salon and Eyrique, in Provence. This latter fig has a dark, rosy pulp, but is otherwise similar to the Dottato, and is probably a variety of that Italian

fig. What the Dottato is for Toscana, Verdone is for Rome. Trojano for Naples, and Marseillaise for Provence. (Fig. 54.)

Doucette, White.—Good, fresh, and dry. France, at Salon.

Doukkar.—The general name of the caprifig in Kabylia.

Douqueira Blanca—*White Douqueira; Ficus carica* var. *goupiliana* Geny.—First crop: Large, $3\frac{1}{2}$ to 4 inches long by $1\frac{1}{2}$ to 2 inches wide. Shape oblong, pyriform; very slender neck; skin thick, slightly downy, with prominent ridges, adhering to the pulp, which is lively red; color of skin yellowish white. Second crop: Smaller, $2\frac{1}{2}$ by $1\frac{1}{2}$ inches. Skin rough, eye large, red. A very good fig.

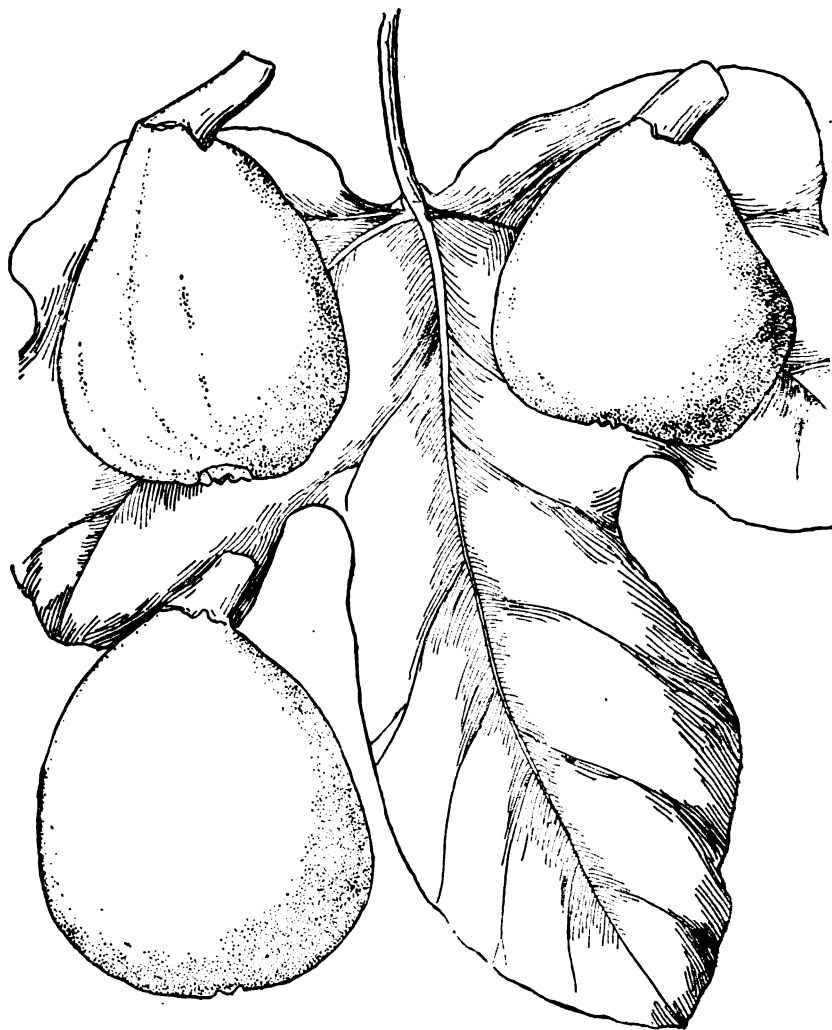


FIG. 53. —Dorée Nobis figs.

Douqueira Negra—*Argusela; Peroquina; Monginence* (Grasse); *Perruquier; Ficus nicaensis* Risso; *Ficus carica* var. *fertilis* Geny.—Two crops. First crop very large, $3\frac{1}{2}$ to 4 inches long by $1\frac{1}{2}$ to 2 inches wide. Oblong, pyriform, with a thin neck. Skin thick, slightly downy, with prominent ribs, adhering to the pulp. Color blackish violet. Pulp lively red, sweet, and agreeable. Second crop much smaller, not good as fresh, but excellent dried. A fig valuable for its first crop or brebas. Extensively cultivated near Nice, in France, where it originated and where it becomes characteristic of the district.

Douro, Black—Black Douro.—Size medium or below medium, pyriform or onion-like, about $1\frac{1}{2}$ inches in both diameters. Stalk very short; neck very narrow and short, well set, but bent. Numerous narrow ribs, especially distinct on the cheeks. Apex flat; eye open, rather large; scales small, upright. Color dark blue, with a fine and dense gray bloom that can not be rubbed off; pulp medium fine, very pale rose, shading to amber, very sweet, but not highly flavored. Tree a moderate grower with close head; leaves medium to large; about 8 inches diameter, rounded, almost entire. Under side very coarse. (Figs. 55, 56.)

Douro—Large Black Douro.—First crop: Very large, about 4 inches long by $2\frac{1}{4}$ wide. Ovoid, with short neck, gradually tapering. Stalk very short. Skin smooth, with thin down. Ribs numerous, very shallow. Color brown, mottled violet, with green on the neck. Eye small, with small scales of a rosy brown color. Leaves medium, broad, 5-lobed, with somewhat serrated edges. Leaves pointed, with pointed lobes, with sinuses of medium depth. Pulp

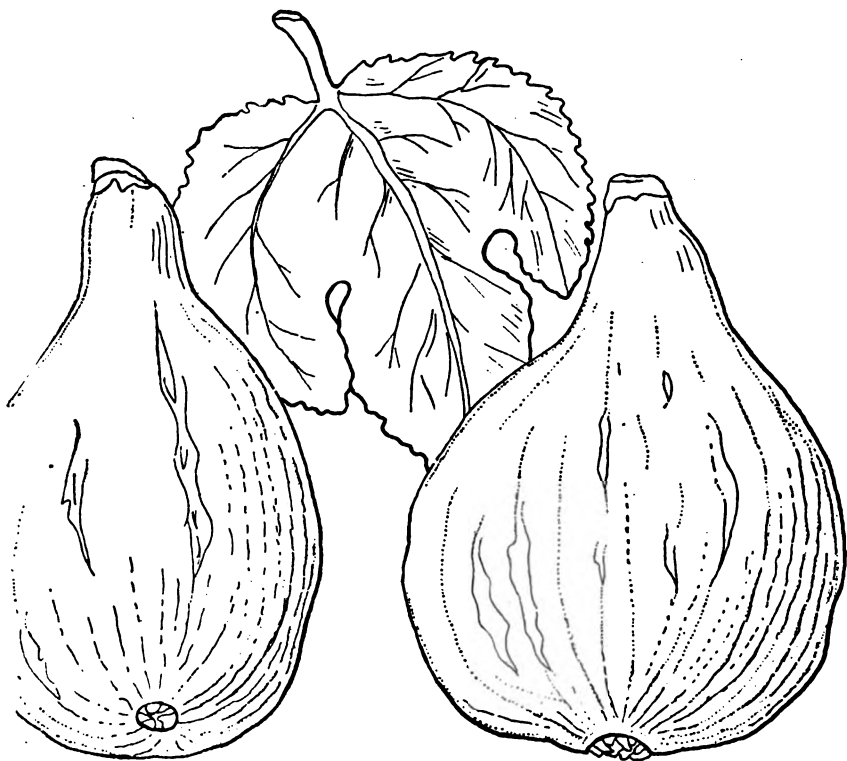


FIG. 54.—Dottato figs.

rosy, brownish red, surrounded by a thick zone of violet flesh of a dark shade. A very superior breba of fine appearance and attractive quality. One of the largest of all figs. Brebas ripe at Niles August 1. (See Portugal, Black.)

Douro Vebra.—Size small, $1\frac{1}{2}$ inches long by $1\frac{1}{4}$ wide; pyriform, tapering, with a short, straight neck; a few ribs near the neck, none on cheeks. Stalk medium to short, one-third the length of the fig; eye prominent, but closed; scales prominent; no iris; skin rather waxy, with faint bloom; color dark violet black, with a little greenish shading around the stalk. Pulp amber, brownish, with a rosy margin; meat white; pulp dense and fine; seeds small. A fair fig, but not highly flavored, at Niles. Tree strong, with a dense head. Leaves variable, large to small, 3 to 5 lobed, with shallow lobes about 5 inches wide by $5\frac{1}{2}$ to 6 long; glossy; lopsided.

Drap d'Or.—Large, $3\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide; pyriform, with very long and distinct neck and a long stalk. Ribs elevated, distinct, waxy, but few in number; apex obtuse and concave at the eye, which is sunk between swollen

cheeks. Eye small, with distinct violet iris; scales rosy amber. Color of skin light violet to reddish amber, not very dark. Ribs darker; between them the

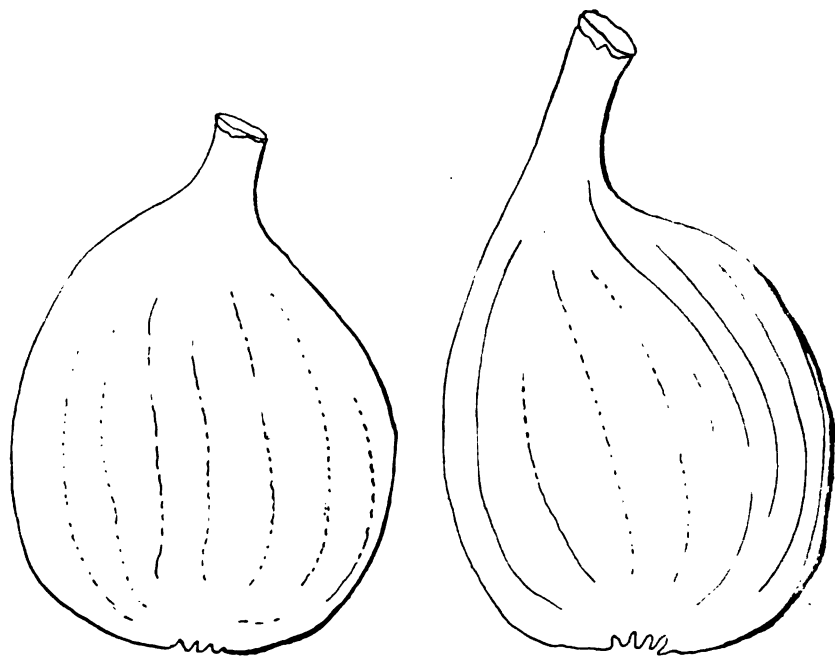


FIG. 55.—Douro, Black figs.

color shades to reddish yellow. darker; neck is of the same color, but the stalk is bright yellowish green. Bloom thin and pale; pulp rosy red; meat yellow amber, of very fine quality; regarded by the French confectioners as one of the best figs for crystallized and glacé fruit. Hogg gives as synonym Brunswick, which is erroneous, this being a different fig. (Fig. 57.)

The side exposed to the light only slightly

Drap d'Or (Barron).—Below medium; almost round; no neck; skin pale greenish yellow shaded with brown; flesh delicate amber, thick juicy, and well flavored. This description given by Barron indicates a very different fig from the preceding, which the author believes is the true *Drap d'Or*.

Du Japon—HIRTÄ.

Du Roi—*Du Roy*.—Size above medium, $2\frac{1}{4}$ by $1\frac{1}{2}$ inches; larger than the *Marseillaise*. Shape rounded, pyriform, uneven, with swollen cheeks. Ribs few, slightly elevated and irregular in outline. Neck distinct, always short, but variable; stalk very short. Eye large to very large, without elevated iris;

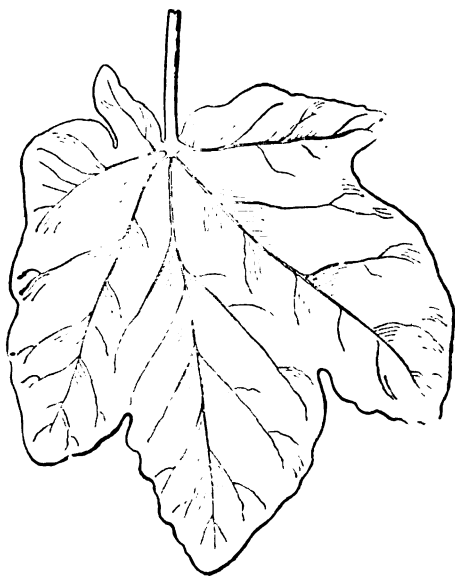


FIG. 56.—Leaf of Douro, Black fig.

scales large, standing out, of a pale amber color. Skin smooth, but not waxy, of a pale bluish-green with a darker green on the exposed side. Pulp amber, with rosy streaks and with many exceedingly minute seeds, and of a fine texture. This fig does not belong to the Marseillaise class. It has smaller seeds and a finer meat and pulp, and is also more oblong than that fig. It is a most excellent fig and one of the very best figs grown in California. Is suitable for drying as well as fresh. In some localities it is preferable to the Marseillaise. This fig can not be too highly recommended and will no doubt become one of the most extensively grown figs in California and Arizona. (Fig. 58.)

Du Roy—DU ROI.

Early Howick—BROWN TURKEY.

Early Violet.—Very small to small. Round, turbinate, with swollen and protruding cheeks; neck distinct, but short; stalk medium to long; ribs distinct, somewhat elevated, sometimes much elevated. Eye large, sunk, closed; scales large, rosy red, with small iris. Skin rough and uneven, violet brown with red flush and a thin peach-colored bloom, which does not quite reach the eye. Pulp red, fine, and sweet. This fig, though small, bears continuously and is valuable on that account. Preferable to the *Ischias* and *Celeste*. (Fig. 59.)

Early White—Early Yellow; Small Early White; Jaune Hâtive.—Small, roundish turbinate, somewhat flattened at apex; color of skin pale yellowish white, very thin skin; pulp white, sweet, but wanting flavor.

Early Yellow—EARLY WHITE.

Ecousse Noire.—Probably the same as *RECOUSSE NOIRE*.

El-hadj.—A black fig from Kabylia which requires caprification.

Endrich.—Two crops; medium size, oblate or pyriform; neck very long; stalk short; ribs shallow; eye very large, open; skin greenish-yellow, no bloom, quite thick; pulp of first crop dingy opaline in center, surrounded by a broad band of muddy but distinctly violet pulp, rather coarse, but sweet.

Second crop has the pulp white, with occasionally a trace of violet around the margin. In drying the pulp turns violet-black. Tree is of medium size, leaves woolly, lobes shallow and rounded. Introduced from Italy by W. B. West, but sold to Mr. Endrich, of Stockton, Cal., who lost the original name. Again propagated, and distributed by Mr. W. B. West and others under the name of *ENDRICH*. Generally a poor fig, but said in some localities to be very excellent; especially so around Stockton, according to Mr. West. Farther inland, in the San Joaquin Valley, this fig is very poor and almost worthless. Some trees sent out under this name are identical with *Rubado*.

Erbeili—LOB INGIR.

Erbeghli—LOB INGIR.

Erbelli—LOB INGIR.

Espagnola—*D'Espagne*.—White. Late. Aix, France.

Esquiliarello—LIPARI.

Euscaire Preto.

Eyrogue—*D'Eyrogue*.—Below medium, oblate; skin pale; yellow, tinted green. Pulp pale rose, juicy, but not rich. France.

Fabre.—Two crops. Large. France.

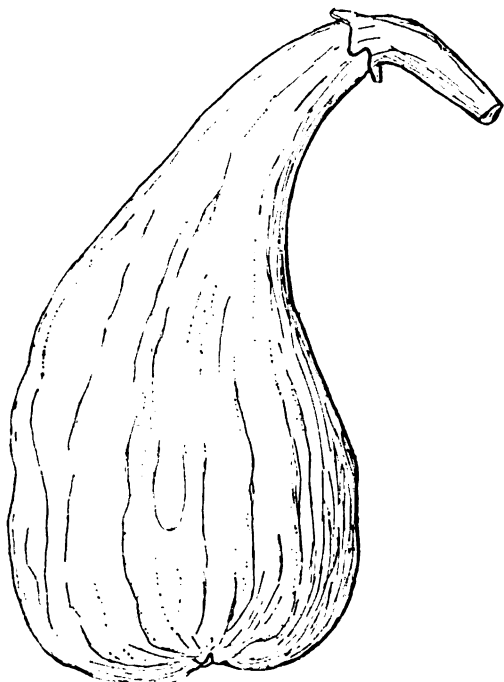


FIG. 57.—*Drap d'Or* fig.

Fallagiana—SAN PEDRO, BLACK.

Fichi de Calabria—DOTTATO.

Fichi di Napoli—DOTTATO.

Fichi Dori—GENTILE.

Fichi d' Oro—ALBO.

Fico Arbicone—SAN PEDRO, BLACK.

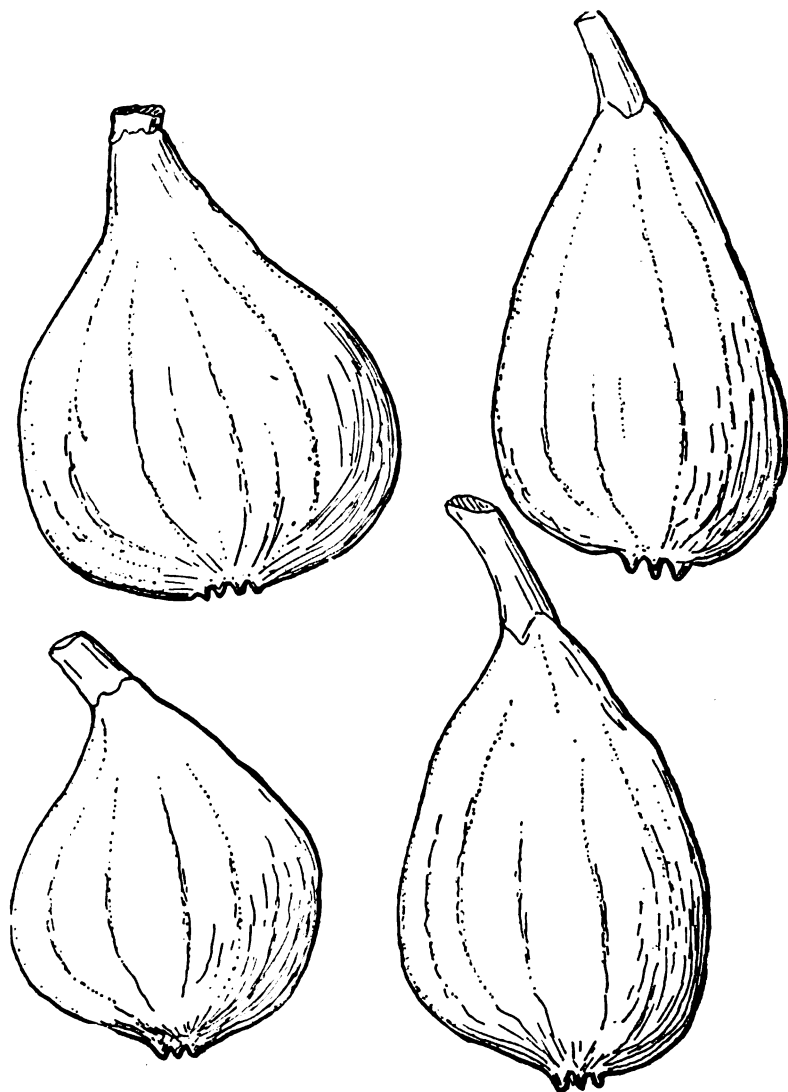


FIG. 58.—Du Roi figs.

Fico da Comadre—COMADRE.

Fico dall' Osso—MERIOUN.

Fico Dattero—ROLANDINA.

Fico della Goccia—DOTTATO.

Fico di Fragola—ADRIATIC.

Fico Dorato—ALBO.

Fico d' Oro—GENTILE.

Fico di Saint Piero—SAN PEDRO, WHITE.

Fico di San Piero or Saint Piero—SAN PEDRO, WHITE.

Fico di San Pietro—SAN PEDRO, WHITE.

Fico de Saint Piere—SAN PEDRO, WHITE.

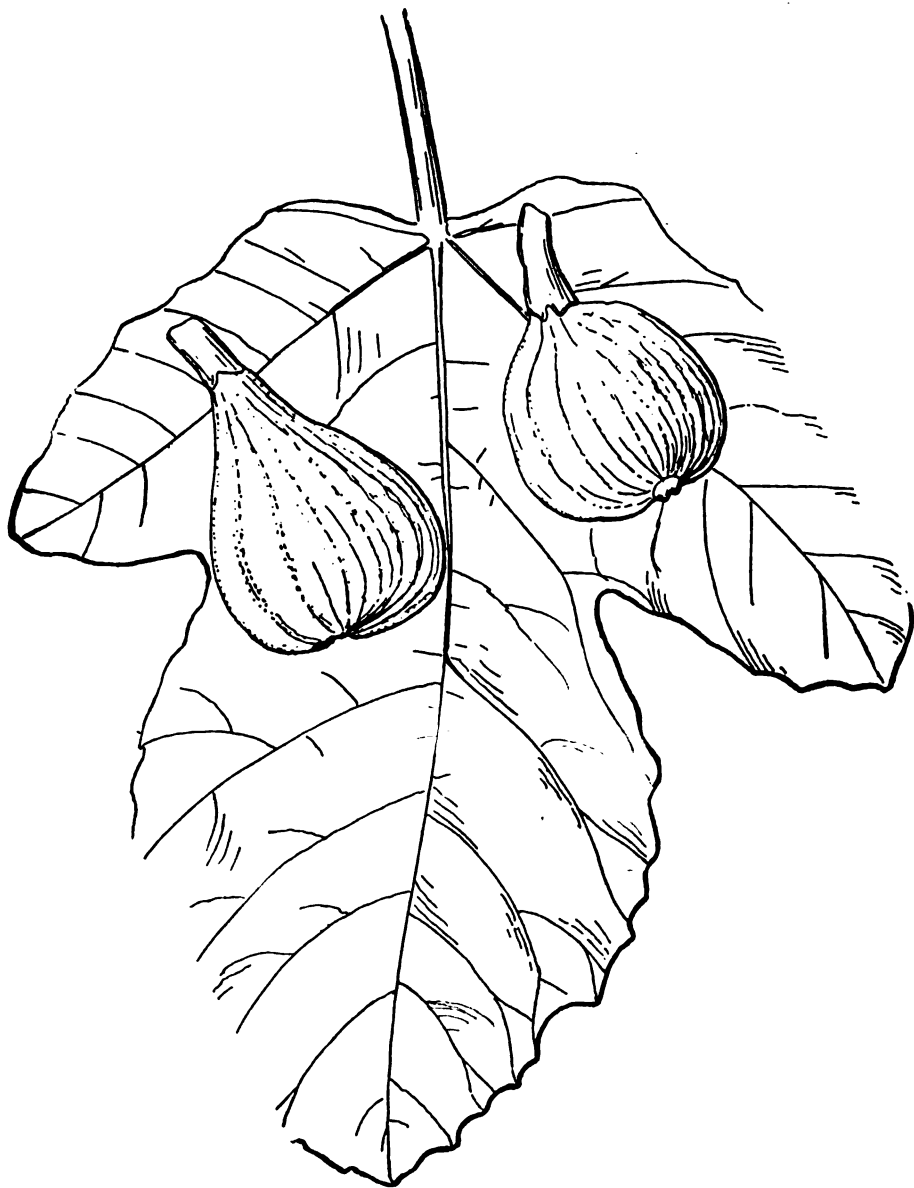


FIG. 59.—Early Violet figs.

Fico di Spagna—FRANCISCANA.

Fico fetifero—MERIOUN.

Fico Nero—SAN PEDRO, BLACK.

Fico ovata—CARAVANCHINA NEGRA.

Fico San Piero—SAN PEDRO, BLACK.

- Fico unico*—FRANCISCANA.
Fico violacea—SAN PEDRO, BLACK.
Fico zentil—ALBO.
Ficus acuta—POUNCHUDA.
Ficus albida—BLANCASSA.
Ficus amara—AMAROUNA.
Ficus barnissote—BARNISSOTTE, BLACK.
Ficus bovina—BOUIN.
Ficus browni—CAIANA.
Ficus caiana—CAIANA.
Ficus candoleana—CAIANA BLANCA.
Ficus carica var. *carmosa*—COL DI SIGNORA BIANCA.
Ficus carica var. *chrysocarpa*—DAURADA.
Ficus carica var. *deceptans* Geny—VERTE BRUNE.
Ficus carica var. *flomantiana*—CABROLIANA.
Ficus carica var. *florentina*—TOSCANA.
Ficus carica var. *fodereana*—BLANCASSA.
Ficus carica var. *formosa*—SUCRADA.
Ficus carica var. *fucosa*—CASTAGNOLA.
Ficus carica var. *goupiliana*—DOUQUEIRA BLANCA.
Ficus carica var. *leiocarpa*—SEIROLA.
Ficus carica var. *ligurica*—PISSALUTTO BIANCO.
Ficus carica var. *lunata*—PRINCESSA.
Ficus carica var. *luteus*—ALBO.
Ficus carica var. *multifera*—VERDAL, LONG.
Ficus carica var. *prolifera*—TAPA CARTIN.
Ficus carica var. *robusta*—RUBADO.
Ficus carica var. *rotundula*—RONDELETTA.
Ficus carica var. *serotina*—GROSSE BEURDOUA.
Ficus cemenleia—CIMEIRENCA.
Ficus clavicularis—CLAVEU.
Ficus collina—CARAVANCHINA.
Ficus cotignana—COTIGNANA.
Ficus domina—COL DI SIGNORA BIANCA.
Ficus dulcissima—BRIASCA DOUSSA.
Ficus dylo var. *amarula*—AMAROUNA.
Ficus erinocea var. *asperima*—COUCOURELA.
Ficus erinocea var. *cemenleia*—CIMEIRENCA.
Ficus erinocea var. *cinerescens*—BORDEAUX.
Ficus erinocea var. *eriocarpa*—PELOUA.
Ficus erinocea var. *erodens*—SARAINA.
Ficus erinocea var. *fertilis*—DOUQUEIRA NEGRA.
Ficus erinocea var. *fustifera*—MERIOUN.
Ficus erinocea var. *gemina*—MERLINGA.
Ficus erinocea var. *jucunda*—BARNISSOTTE, BLACK.
Ficus erinocea var. *longicaulis*—CLAVEU.
Ficus erinocea var. *melongena*—MERENGIANA.
Ficus erinocea var. *mentonensis*—MENTONASCA.
Ficus erinocea var. *salsula*—MOUISSOUNA.
Ficus erinocea var. *saxetana*—NEGRETTE.
Ficus erinocea var. *uberrima*—SAN PEDRO, BLACK.
Ficus franciscana—FRANCISCANA.
Ficus fusca—COUCOURELE BRUNE.
Ficus gallica—CATALAN.
Ficus garideli—BERNISSENCA.
Ficus grandis—BARNISSOTTE, WHITE.
Ficus grassensis—MATARASSA.
Ficus helena—RONDELLA BLANCA.
Ficus hirta—HIRT.
Ficus imperialis—IMPERIAL.
Ficus labillardiera—COUCOURELLE GAVOTTE.
Ficus linneana—MUSSEGA.
Ficus longicaudata—PECONJUDO.
Ficus lutea—DAURADA.
Ficus marsiliensis—ATHÈNES.
Ficus meirana—MEIRANA.
Ficus melitensis—MERENGIANA.
Ficus mellifera—MEOU.

- Ficus monstrosa*—TAPA CARTIN.
Ficus mouissona—MOUISSOUNA.
Ficus mourenao—MOURENAO.
Ficus nicaricensis—DOUQUEIRA NEGRA.
Ficus nigra—NEGRETTE.
Ficus nucleata—MERIOUN.
Ficus obovata—CARAVANCHINA NEGRA.
Ficus phoceana—MARSEILLAISE, BLACK.
Ficus pilosa—PELOUA.
Ficus polymorpha var. *depressa*—BARNISSOTTE, BLACK.
Ficus polymorpha var. *hematocarpa*—FRANCISCANA.
Ficus pulchella—GENTILE.
Ficus punctulata—MUSSEGA NEGRA.
Ficus purpureo-violacea—SALADA.
Ficus radiata—PRINCESSA.
Ficus richardi—RUBADO.
Ficus richeta—OME.
Ficus rolandina—ROLANDINA.
Ficus rosa nigra—ROLANDINA NEGRA.
Ficus saccharata—SUCRADA.
Ficus saffrenia—PISSALUTTO NEGRO.
Ficus saracenicæ—SARAÏNA.
Ficus seirola—SEIROLA.
Ficus serotina—RUBADO NEGRO.
Ficus siciliana—SICILIANA.
Ficus smithii—LEVENSSANA.
Ficus sylvestris var. *africana*—CAIANA.
Ficus sylvestris var. *alpestris*—LEVENSSANA.
Ficus sylvestris var. *bruttia*—SICILIANA.
Ficus sylvestris var. *calabra*—CALABRESA.
Ficus sylvestris var. *ceresana*—RONDELLA NEGRA.
Ficus sylvestris var. *festinatissima*—BRIASCA.
Ficus sylvestris var. *hyberna*—RUBADO NEGRO.
Ficus sylvestris var. *mauritanica*—MORESCA.
Ficus sylvestris var. *monstrosa*—FOURASSA.
Ficus sylvestris var. *obovalis*—CARAVANCHINA NEGRA.
Ficus sylvestris var. *olivula*—MOURENAO.
Ficus sylvestris var. *præcox*—COTIGNANA.
Ficus sylvestris var. *prædulcis*—ROLANDINA.
Ficus sylvestris var. *prælonga*—POUNCHUDA.
Ficus sylvestris var. *rubella*—ROUSSANA.
Ficus sylvestris var. *rubricaulis*—ROLANDINA NEGRA.
Ficus sylvestris var. *rufescens*—NEGRAU.
Ficus sylvestris var. *smyrna*—MEOU.
Ficus sylvestris var. *sublittoralis*—CARAVANCHINA.
Ficus sylvestris var. *tragus*—DOMESTICA.
Ficus sylvestris var. *turgens*—FRANCISCANA.
Ficus sylvestris var. *ventricosa*—MATELASSA.
Ficus tournefortiana—COUCOURELA.
Ficus variabilis—VERDAL, WHITE.
Ficus vezoso—ROLANDINA.
Ficus virescens—VERDAL, LONG.
Figa a Merioun—MERIOUN.
Figa Bovin—BOVIN.
Figa clou—CLAVEU.
Figa de Meou—MEOU.
Figa d'Ome—OME.
Figa domestica—DOMESTICA.
Figa florentina—TOSCANA.
Figa fourrassa—FOURASSA.
Figa maravilla—PRINCESSA.
Figa mielleuse—MEOU.
Figa negrau—NEGRAU.
Figa princessa—PRINCESSA.
Figa rubado—FRANCISCANA.
Figa rubado—RUBADO.
Figa siciliana—SICILIANA.

Figa turca—PRINCESSA.

Figa verdara—CIMEIRENCA.

Figo melograno—FRANCISCANA.

Figue d'Athènes—ATHÈNES.

Figue de Dalmatia—DALMATIA.

Figue datte(?)—DATTE QUOTIDIENNE.

Figue de Grasse—MATARASSA.

Figue de Mentone—MENTONASCA.

Figue Mielieuse—MEOU.

Figue de Naples—MARSEILLAISE, WHITE.

Figue d'Or—DORÉE.

Figue franciscain—FRANCISCANA.

Figue d'Or.—It is doubtful if this is a synonym of Brunswick, as stated by several continental writers. Students of hothouse figs are too ready to lump figs, received under different names, together as synonyms, relying principally upon resemblances of the first crop, the second crop seldom maturing under glass, or at least not maturing to perfection. Thus it has come to pass that many of the synonyms given by Dr. Hogg are in reality distinct figs, but which show only their true characteristics when growing in suitable localities out of doors and in climates favorable to the full development of the figs.

Figue Grise—BEAUCAIRE.

Figue Grise—COTIGNANA.

Figue Grise—MATARASSA.

Figue Poire—BORDEAUX.

Figue Poire—SAN PEDRO, BLACK.

Figue Reine—MUSSEGA.

Figue violette—MOUISOUNA.

Figuier Rouge—VIOLETTE DE LA FRETTE.

Fiquo Aubiquon—BORDEAUX.

Florentina—TOSCANA.

Fleur Rouge—BROWN TURKEY.

Florentina—CABROLIANA.

Ford—*Ford Seedling*.—Large or above medium; shape, turbinate-pyriform, rather uneven, with swollen cheeks, hanging and protruding above the eye. Neck very short, but distinct, like a stalk; stalk none; ribs not elevated, but colored darker; eye open, medium size, sunk below the cheeks, but slightly elevated at the scales; scales, many in the row (9 or 10), irregular, red; skin, smooth, dark, violet in sun, greenish in shade, sometimes greenish with violet flesh. Light-gray bloom; pulp rosy red, coarse; meat, rosy white. A very large fig, heavy crops and strong growth, coarse quality. The above fig is a different fig from the fig described under that name by Dr. Hogg, who regards it identical with Marseillaise. (Figs. 60, 61.)

Ford Seedling—FORD.

Fourrassa—*Figa Fourrassa* (Nice); *Ficus sylvestris* var. *monstruosa*, Geny.—Second crop very large, 4½ by 3½ inches; oblong, rounded at apex; skin thick, of a gray or greenish-yellow color, marked with small dots; pulp, red, juicy; medium quality. One of the largest figs, but of doubtful value. Nice and its vicinity.

Franche Paillard—*Abondance*; *D'Abondance*; *Franque Pagarde*.—Two crops. First crop: Medium, oblong; skin light brown; pulp salmon-red. Second crop: Medium, pear-shaped, violet-brown color, green in shade; pulp red, vinous, and juicy, but not always sweet. An enormous bearer, of value only in few favored localities in France, where it is extensively cultivated, or at least distributed.

Franciscan—FRANCISCANA.

Franciscana—*San Francé*; *Franciscan*; *Figue franciscain*; *Figo melograno* (Italy); *Fico unico* (Port Maurice); *Fico di Spagna*; *Figa rubado* (western Riviera); *Ficus franciscana* Risso; *Ficus sylvestris* var. *turgenia* Geny; *Ficus polymorpha* var. *hematocarpa* Gasparrini; *St. Francis*.—One crop; medium: 2 to 2½ inches diameter, turbinate, flattened at apex; skin cracking; color bright greenish-violet; pulp juicy, honey like, blood-red or of the color of the red pomegranate. A fig good for drying, but it cracks and splits wide open like a flower after having been exposed to a rain storm. Not uncommon in the Riviera around Nice, France.

Franque Pagarde—FRANCHE PAILLARD.

Frette—ROUGE DE LA FRETTE.

Genoa, Black—*Negro d'España*, *Noire d'Espagne*, *Nigra*: *Black Spanish*.—Large, oblong, broad toward the apex, very slender toward the stalk; skin dark pur-

ple. almost black, with a thick blue bloom; pulp yellowish nearly to the meat, reddish or red toward center; juicy, sweet, and rich. Said by Hogg to be the most common black fig in Languedoc and Provence. This is not now the case.

Genoa, White—White Genoa.—Size above medium, $2\frac{1}{2}$ by $1\frac{1}{4}$ inches; shape pyriform; neck small, not set off; stalk very short; ribs very shallow, merely elevated lines. Skin downy; eye very small, not elevated, open, pale pink-amber. Skin pale olive-green with yellow cheek, drawing to pale yellow-amber, mottled with russet around the eye; color of neck the same. Pulp varying from amber to pale rose and darker red; under the skin pale greenish-white. Tree a strong grower, with open head; branches brittle, breaking readily; leaves very large, deep green, 5-lobed. One of the best figs, entirely distinct from the Marseillaise, which is given as a synonym by Dr. Hogg—not even belonging

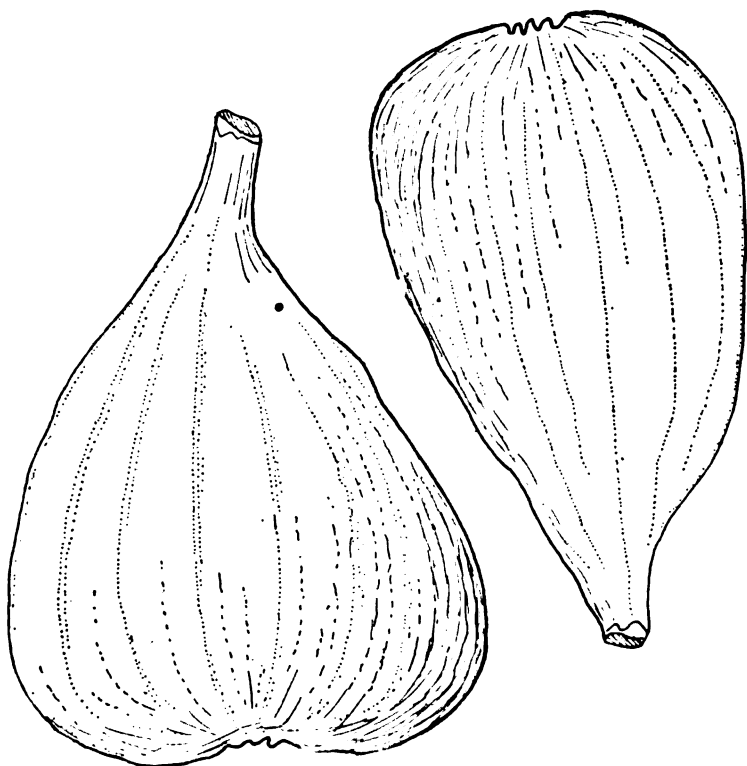


FIG. 60.—Ford figs.

to the same class. It is undoubtedly one of the best figs grown in California. The identity of this fig is, however, not fully established, and it may be possible that it is identical with some of the many Italian figs not yet introduced to this country or even adequately described. The origin of the name under which this fig came to California is not known. (Fig. 62.)

Gentile—Tiburtina, Pliny; *Gentile sub-lutei*; *Gentile Bianchi*; *Fichi Dori*; *Fico D'Oro*; *La Gentile*; *Ficus pulchella*, Risso; *Dr. Kimball's White* (Haywards, Cal.).—First crop: Very large, $2\frac{1}{2}$ by 3 inches; shape ovate-pyriform, widest below the center; neck swollen, very distinct, well set, but not long; stalk very short; skin uneven, with ridges, which become less at perfect maturity; skin adheres to pulp; eye very large, open, with the scales protruding. Color green, shaded to canary or yellow, spotted white, darker green in the shade. Pulp amber, translucent, very sweet and highly flavored, streaked with rose; seed few, but very large. Leaves 3-lobed, very large, of dark-green color similar to that of Brogiotto-Genovese and Sanguinello Pisa. Large tree with the lower branches very long and weeping; the upper branches tall

and upright: a very pretty growth. Only the first crop ripens well. Second

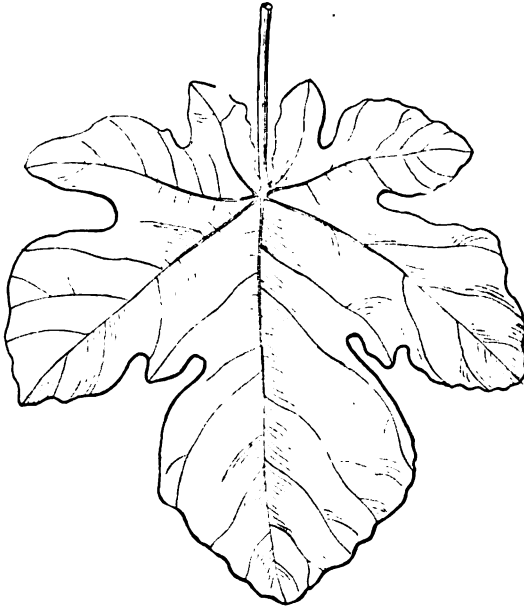


FIG. 61.—Leaf of Ford fig.

crop, when it is partially mature, is of rounder form, but always drops. One of the very best Italian figs, and especially valued as a table fig. Extensively

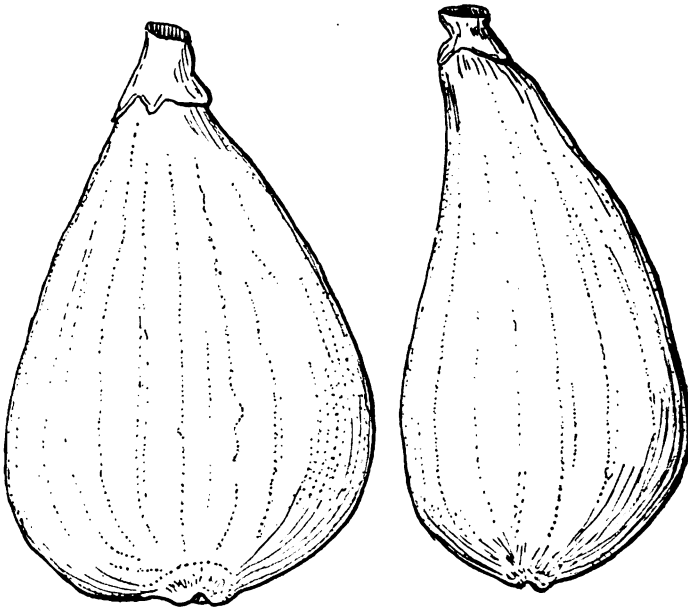


FIG. 62.—Genoa, White figs.

grown from Naples to Toscana and Riviera, but does well also farther north. The Gentile (pronounced gentele) is one of the most luscious, pulpy, and

highly flavored of all figs, and should be generally cultivated. It grows best in deep, rich bottom lands with moist ground, and does not take well to dry hills. So far only a few figs of this variety are grown in California. The oldest tree in the State is found on Dr. Kimball's place, near Haywards (Alameda County). Other trees, now 8 years old, are grown at Knights Ferry. The second crop drops there, as it does in Italy and elsewhere. The climate of Knights Ferry is very warm and dry, while that of Niles and Haywards is

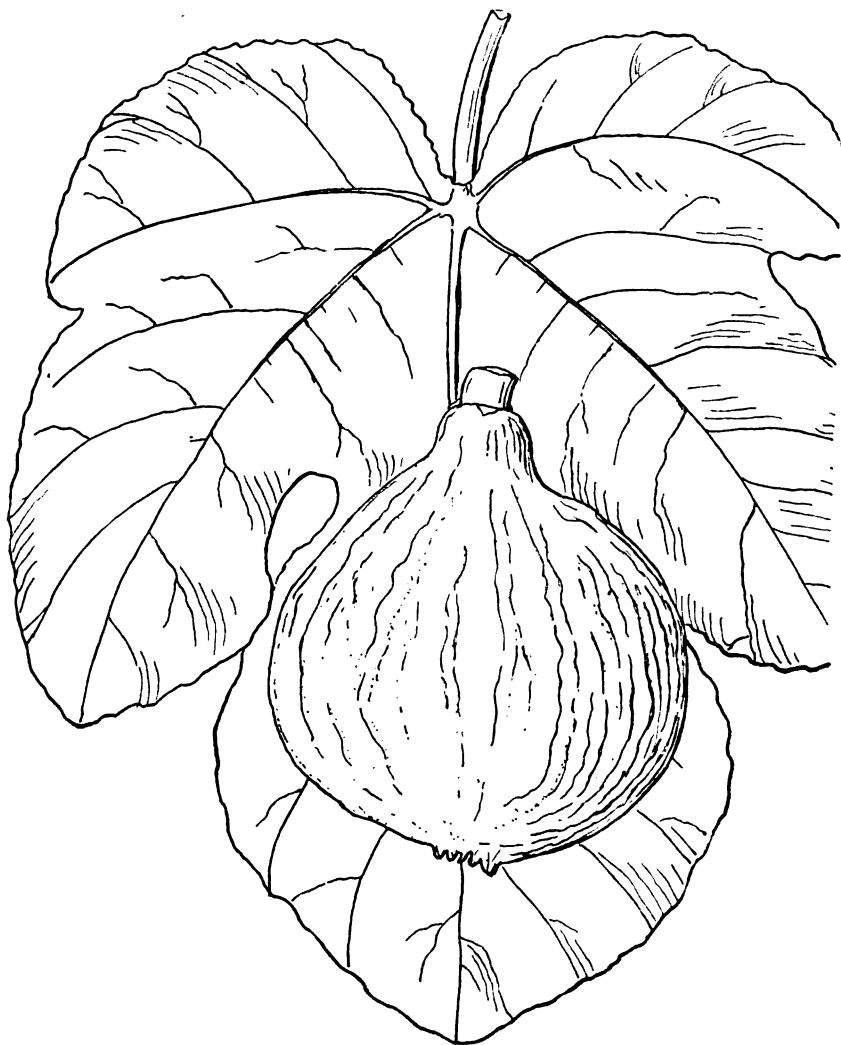


FIG. 63.—Gentile fig in California.

moist and comparatively cool. It was supposed for years that all that this fig required was a warm and dry air in order to ripen the second crop. But its failure to do so, even in the hottest place, satisfies the author that it belongs to the San Pedro class, which requires caprification for the second crop, the flowers of which are apparently perfect female flowers. It appears that in Italy several figs are known as Gentile, but the one described above is the true Gentile, and no other varieties should bear that name. (Figs. 63, 64, 65.)

Gentile—DOTTATO.

Gentile (Bologna)—ALBO.

Gentile di Napoli—DOTTATO.

Gentile sub-lutea—GENTILE.

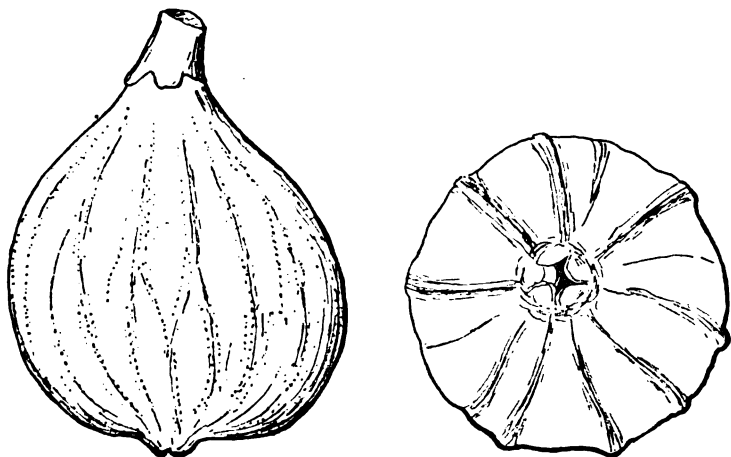


FIG. 64.—Gentile fig in California, unripe.

Gentile Bianchi—GENTILE.

Gentili—DOTTATO.

Gentilla Roussa—MORESCA.

Giallo Rotondo.—Italy. Probably identical with some other variety.

Giallo Verde.—Italy.

Gironetta—VERDAL, LONG.

Goccia—DOTTATO.

Gombaya.—Medium, rounded; bright rose; stem of tree blackish; requires moist soils. A fig of value grown in the vicinity of Valencia, Spain, where it is much esteemed.

Gouraud Noire—*Gourreau noire*; *Gourreau du Languedoc*; *Bourdou*; *Bourrailese*; *Maris No. 2*.—Two crops. First crop: Large, pyriform, oblong, skin very bright violet black, passing to vinous red toward the stem, cracking when ripe; pulp red, very good. Second crop: Medium, pyriform, oblong, skin dark violet purple; pulp red, sweet, but dry. A very vigorous-growing tree, and a good fig to recommend.

Gouraud Rouge.—Medium, pyriform, rounded, with flattened apex about 1½ inches long by 2 inches wide. No neck and very short stalk; eye small but rough and open, depressions around the iris; scales dark violet; ribs many, narrow, and shallow; skin rough, dull yellowish red to reddish violet, not at all handsome, but with a violet pale bloom. Pulp reddish brown, hollow center, juicy and firm and flavored. Leaves very small, 4½ inches long by 4 inches wide, almost entire, with 3 to 5 very shallow lobes.

Gourreau du Languedoc—GOURAUD NOIRE.

Gourreau Noire—GOURAUD NOIRE.

Graissane.—Round, flattened, color white, taste poor. Provence.

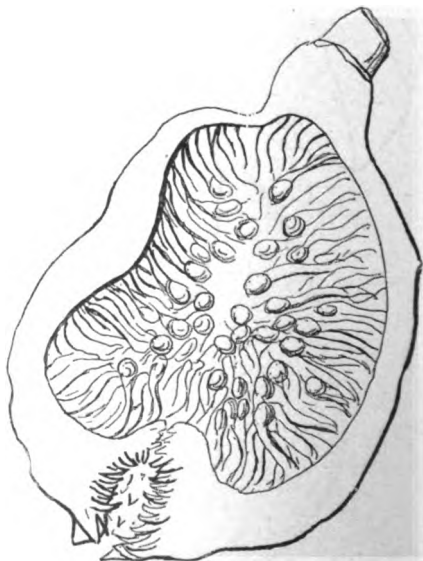


FIG. 65.—Gentile fig, cross section.

Grassale.—From the Garden of the Royal Horticultural Society at Chiswick. Small, about 1½ inches long by 1 inch wide, turbinate. Neck short and slender; stalk short; ribs indistinct; eye very small, open; skin waxy, yellow; pulp pale violet amber, finely grained; meat white; tree moderate, spreading; leaves medium to small, 5-lobed and rounded. It is doubtful if this tree is the true Grassale. I take the one described under Matarassa as the true variety of this name.

Grassale—MATARASSA.

Grasse—MATARASSA.

Grassengue—MATARASSA.

Gray Servantine—SERVANTINE GRISE.

Gray Fig—BEAUCAIRE.

Green Ischia—ISCHIA, WHITE.

Grise Servantine Bifère—SERVANTINE BIFÈRE.

Grisette—BEAUCAIRE.

Grisette Hâtive—BEAUCAIRE.

Grosse Banoie—France.

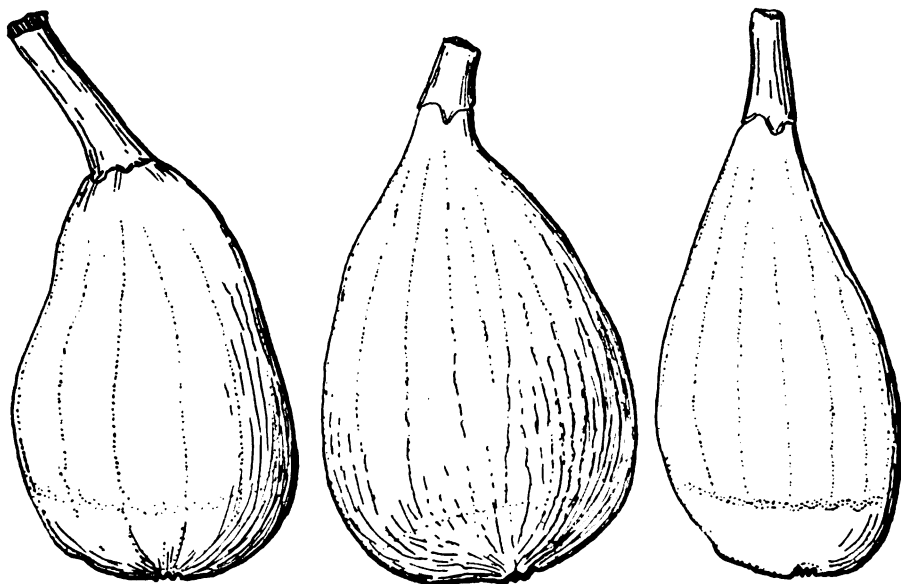


FIG. 64. —Grosse Grise Bifère figs.

Grosse Beurdoua—Berdaula; *Ficus carica* var. *serotina* Geny; Verdaou. —Size large, 2½ to 3 inches, distinctly turbinate; color greenish yellow; pulp red. Provence, at Grasse and St. Tropez, France.

Grosse Blanche Longue—MARSEILLAISE, LONG.

Grosse Blanche Ronde—BLANCHE.

Grosse Capucine—France.

Grosse du Draguignan—AGEN.

Grosse Grise Bifère—*Grosse Servantine Bifère*. —Medium or above, 2½ inches long by 1½ inches wide. Ovate pyriform; neck very short, but distinct, stalk short to medium, about one-fourth inch. Ribs distinct, but narrow, and hardly elevated; colored darker than the skin, of a violet brown. Eye small, open, slightly elevated, amber violet, with a dark iris. Skin downy, of a dark violet amber in the sun, turning to a pale olive green with yellow flush, with darker violet ribs in the shade. Bloom a very fine violet-pearl gray extending to the cheek, but not to the apex zone from which it is separated by a distinct line, between which and the apex there is no trace of the bloom. This is the most characteristic feature of this fig. Pulp deep red or dark rose; meat pale, greenish white. A very tender, good fig. This fig has been disseminated in California under the erroneous name of *Gray Bourgasotte*, but is distinctly different from that fig, which is round and flattened. (Figs. 66, 67.)

Grosse du Languedoc—GOURAUD NOIRE.

Grosse Jaune—TAPA CARTIN.

Grosse Marseillaise—MARSEILLAISE, LONG.

Grosse Marseilles—MARSEILLAISE, LONG.

Grosse Marseilles.—Fruit medium, long, pyriform; skin greenish yellow, shaded brown; pulp dull red, second quality. (All according to Barron.)

Grosse Monstreuse de Lipari.—First crop: Fruit very large, 3 inches wide and nearly as high; turbinate, broad and flattened at apex; skin pale chestnut brown, darker on the side exposed to the sun, and marked with dark longitudinal ribs down to the sides, and with occasional dark spots, the whole surface covered with thick bloom. Stalk short and thick; eye large and closed; flesh dull red, thick, juicy, and well flavored. (Hogg.) Found by Hogg in an orchard at Bouches des Rhone, France.

Grosse Rouge de Bordeaux—SAN PEDRO, BLACK.—It is doubtful if this is synonym of Black San Pedro. It is not a synonym of Bordeaux, which is a smaller fig.

Grosse Savantine Bifère—GROSSE GRISE BIFÈRE.—Under this name the author has received from the Royal Horticultural Society of London a fig in every respect identical with *Grosse Grise Bifère*, characterized by the peculiar arrangement of the bloom of that fig. The bloom is absent from the apex near the eye, and there is a strong line of demarcation between the two zones.

Grosse Verdale—VERDAL, LONG.

Grosse Verte—ADRIATIC.

Grosse Violette—DAUPHINE.

Grosse Violette de Bordeaux—SAN PEDRO, BLACK.—This fig is not identical with *Bordeaux*, which is a smaller fig.

Grosse Violette Longue—SAN PEDRO, BLACK.

Grosso Figo—BARNISSOTTE, BLACK.

Guiljiana—GUILLOANA.

Guiliana—*Guiliana*.—Small, round, turbinate, about $1\frac{1}{2}$ inches; no neck; no stalk. Ribs few, distinct; eye small, open, scales large, violet amber. Large violet iris. Color dingy violet gray, greenish in shade, with blue bloom on stalk end, not reaching the equatorial. Pulp brownish salmon; inner scales rosy red. A sweet fig, but of very poor appearance. Leaves small, 3-lobed, very shallow lobes, almost entire. The spelling is somewhat in doubt. It was received under the synonym.

Hanover—BRUNSWICK.

Hardy Prolific.—Large to medium; pyriform; about $2\frac{1}{4}$ to $2\frac{1}{2}$ inches long by $2\frac{1}{4}$ inches wide; generally very flat at apex, lopsided and variable, very much in the shape of Brunswick fig, to which this variety stands very near; neck generally well set, but very short; ribs few, rough, wavy, but shallow, disappearing, and irregular; eye medium, flat, with low iris, scales pale amber; skin smooth, except for ribs, rather waxy, greenish on one side, violet olive on the other. Pulp amber white; meat white, very juicy and good, but not highly flavored. Second crop more turbinate and resembles Brunswick less than first crop. Tree a very strong grower with a fine head. Leaves medium to large, 5 lobed, about $7\frac{1}{2}$ inches long by $7\frac{1}{4}$ inches wide. A large, good fig.

Hirta—*Del Giappono*; *Hirta du Japon*; *Du Japon*; *Japanese fig*.—Size, $2\frac{1}{4}$ by $1\frac{1}{4}$ inches; medium; round, with distinct neck and very short stalk; ribs indistinct; cheeks swollen and uneven; eye very open, scales small, rosy red, iris small, but rough; skin smooth, but not waxy, not downy even when magnified. Color bluish brown, with red and green flush in the shade; pulp fine, pale amber; meat fine, white; seeds small; leaves small, 3-lobed, thick, almost entire. Tree a very poor grower. A Japanese fig of medium quality. There is said to exist another *Hirta* with downy fruit, also from Japan. (Fig. 68.)

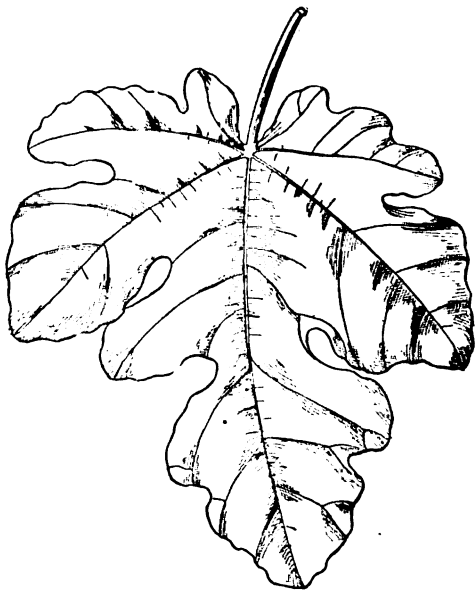


FIG. 67.—Leaf of *Grosse Grise Bifère* fig.

Hirta du Japon—HIRTA.

Hospitalier.—A white drying fig from Salon, France.

Honey Fig—MEOU.

Howick—BROWN TURKEY.

Imperial—*Imperiau* (Nice); *Imperiala* (Italy); *Ficus imperialis* Risso.—Two crops. First crop medium and of poor quality. Second crop: $2\frac{1}{2}$ by $2\frac{1}{2}$ inches,

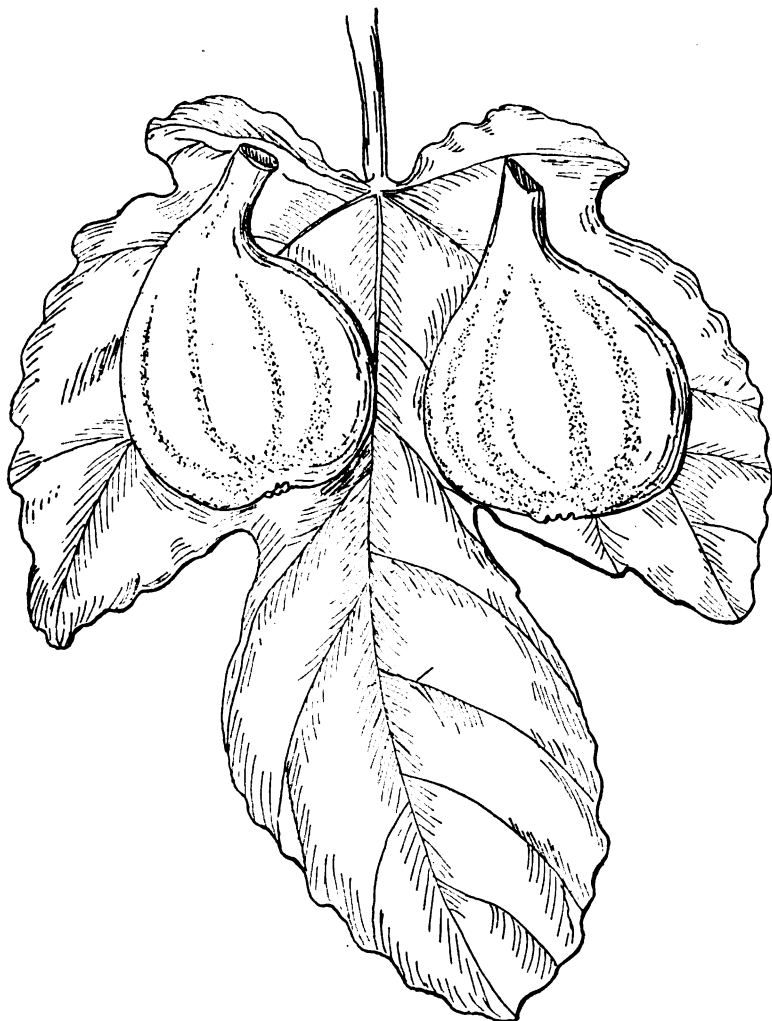


FIG. 68.—Hirta figs.

turbinate, lopsided and cracked, with a long neck which is quite hard. Color greenish gray, tinted violet red, with a bright red eye. Pulp pale red; quality medium. Common around Grasse, in Provence.

Imperiala—IMPERIAL.

Imperiau—IMPERIAL.

Ischia, Black—*Blue Ischia, Black Ischia*.—Small, about $1\frac{1}{2}$ by $1\frac{1}{2}$ inches; neck short; stalk short to medium; skin smooth, with few ribs, of which only one here and there is distinct. Color dark violet black, lighter and somewhat greenish around the apex. Neck as dark as the body; shaded and flushed green. Eye

medium, open, scales rosy violet; no iris. Bloom thin, very dark blue. Pulp red; meat greenish amber. A fair fig of small size, sweet, but poor flavor. Second crop is larger, sometimes $2\frac{1}{2}$ inches long by $1\frac{1}{4}$ wide. Skin with numerous very small golden specks; ribs more distinct and numerous. Eye flat, open; pulp violet red; better quality than first crop. Leaves 3-lobed, almost entire. A handsome rounded tree, giving much shade. A common variety, but one which could easily be dispensed with. The two *Ischias* are undoubtedly only color varieties of the same form. The leaves, habit of trees, shape of trees, etc., are the same. The form of the figs in the two varieties is almost the same, though in the black form the fig is slightly longer. (Fig. 69.) The spot on the leaf (*a*) illustrates the appearance of the iris of the eye.

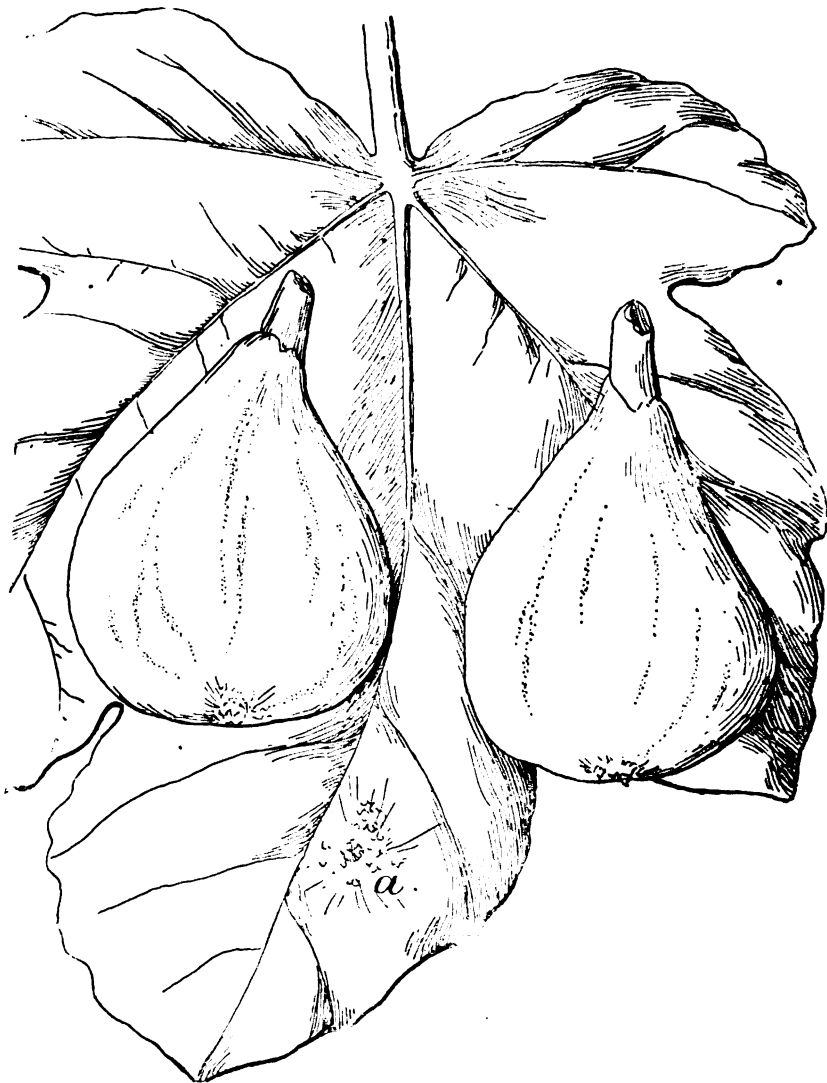


FIG. 69.—*Ischia*, Black figs.

***Ischia*, Brown**—Chestnut-colored *Ischia*.—Medium, roundish turbinate; eye very large, color light brown; skin thin, bursting easily after rain. A color variety of the Black *Ischia*.

Ischia, White—*Green Ischia*; Singleton, Hogg; *Brocket Hall*, Hogg.—Size small or very small, about $1\frac{1}{4}$ by $1\frac{1}{4}$ inches; shape round, with a small, narrow, distinct neck; stalk very short or variable, always very thin and weak. Ribs distinct on the cheeks, less pronounced toward the stalk, and entirely disappearing on the apex. Eye open, scales amber rose, large, no iris and the region around the eye not in the least elevated. Skin smooth, bluish green,



FIG. 70.—Ischia, White figs.

with a light-brown flush and violet-brown ribs. Pulp rosy red; meat white. A sweet fig, but very small and with no flavor. Requires moist, rich soil. The crown is large, round, dense, and compact. Leaves shallow, 3-lobed, with rounded lobes. A very common fig in California, but one which hardly deserves cultivation when so many superior varieties are to be had. (Fig. 70.)

Italian—BROWN TURKEY.

Japanese Fig—HITA.

Jasper—*A bois Jaspé; A bois et fruit Jaspé* (France).—Fruit medium to large, 3 by 2 inches, pyriform; neck short and only its apex well set; stalk short or none; slightly tapering; apex flat; ribs distinct, irregular, confluent. Eye small, closed; scales upright; color green and bronze, with pale and scant bloom. Pulp fine; seeds few and small; color of pulp pale rosy amber. Sweet and juicy, not highly flavored, but good. Leaves coarse, medium size, deeply 5-lobed, rough both above and below; stalk bent. Not identical with either Panachée or Col de Signora Panachée.

Jaune de Toulouse.—Large, oblong; yellow skin and pulp. A very handsome fig. Medium early.

Jaune Hâtive—EARLY WHITE.

Jerusalem—*De Gerusalem; Di Gerusalem*.—Medium, roundish; stalk stout and short. Eye quite closed; skin black, with reddish mahogany toward the stalk; blue bloom. Pulp dark blood red, rich, sweet, and finely flavored. A very good fig.

Jorest.—Medium, oblong turbinate; red skin; pulp white. A very productive and handsome French fig of exquisite quality.

Kargigna—*Karginga*.—Medium or below medium, turbinate; skin thin, white; pulp amber. A rather early Dalmatian fig, of medium quality, good only for table, and hardly worthy of cultivation. Introduced into California by G. N. Milco. Possibly identical with Natalino.

Karginga—KARGIGNA.

Kassaba.—A Smyrna fig requiring caprification. Skin yellowish green. The shape is that of a somewhat flattened onion—transversely ovate. Pulp blood red. (See Smyrna figs, p. 278.)

La Castagnola—CASTAGNOLA.

La Douqueiretta—CABROLIANA.

La Gentile—GENTILE. See also DOTTATO.

La Melette—ANGÉLIQUE.

Lady Heart—CUERS.

Lampas—LAMPEIRA.

Lampeira (Algarve)—*Portoghese* (Italy); *Lampas* (Portugal).—Size, 4½ by 2½ inches; shape roundish-pyriform, with long, slender neck, well set and shouldered. Stalk very short; shape rather irregular, lopsided, largest diameter at center. Eye medium, raised; scales pink. Skin thin or medium, greenish brown, green in shade, brownish violet in the sun; pulp coarse, rose colored, very sweet, juicy, but lacking flavor. Leaves small, 3 to 5 lobed, but lobes very shallow. Tree of medium growth; first crop of brebas abundant. Second crop drops. A fig common in northern Italy, and cultivated for its first-crop figs. Also common in Algarve, Portugal. Link says that in Portugal the first crop of this variety is called "figos Lampas," and is especially cultivated around Tavira, in Algarve. The second crop he designates as "figos vendimos," which is probably an error, the author having good ground to believe that the "figos vendimos" come from a different variety. This fig belongs to the San Pedro class, the trees sent to Niles through the Department of Agriculture having matured splendid second-crop figs after having been caprified. It is certain, however, that the Lampeira is one of the finest of all first-crop figs, and that it should be widely distributed. What the White San Pedro is for Andalusia in producing the luscious brebas the Lampeira is for southern Portugal. (Fig. 71.)

Lardaro.—Size large to medium, often 3 inches long by 1½ wide. Neck long, tapering from the center of the fig. Stalk very short. Numerous ribs, which are warty and irregular. Eye flat, small, but open. Color of skin olive-yellow, with dingy violet brown ribs. Stalk and neck green without the brown. Eye with a violet iris, the scales being small and not prominent. No prominent bloom. Pulp rosy violet, rather pale. Inside hollow. Meat thick, white or yellow. The pulp is very coarse, but pleasant. Tree is a medium grower, with large 3-lobed leaves. Branches straggling spreading. An abundant cropper. In form this fig resembles Pied du Bœuf. The most common fig around Naples, Italy. Valued on account of its abundant crop.

Large Black Douro—DOURO.

Large Blue—BROWN TURKEY.

Large White Turkey—BRUNSWICK.

La Rousse—ROSE BLANCHE.

La Sucrada—SUCRADA.

La Toscana—TOSCANA.

Lee's Perpetual—BROWN TURKEY.

Leker Ingir.—A Smyrna fig requiring caprification. Color of skin greenish-ochre. Not handsome. Skin with dark specks. Stem and neck very short or absent. Imported by Roeding. (See Smyrna figs, p. 278.)

Levant—Turqui.—Very large, oblong; skin white; leaves lacinate. (All according to Duhamel.)

Levenssana.—*Ficus smithii* Risso; *Ficus sylvestris* var. *alpestris* Geny.—Size medium; 2½ inches diameter, globular, flattened; skin hard, glossy, adhering to the pulp; color of skin pistachio green on the stalk end, brownish violet on the apex side. Eye red, surrounded by a violet iris; pulp bright red. Very agreeable taste. Common at Levens, near Nice, France.



FIG. 71.—Lampeira fig.

Lipari—*Petite Blanche Ronde*; *De Lipari*; *Blanquette*; *Blanquette* and *Esquillarello* (Provence); *Verte Petite*; *Bouton du Guêtre*.—Size very small, the smallest of all figs of the *Ficus carica* species—about three-fourths inch to 1 inch long. Globular, with longitudinal ridges; stalk one-eighth inch long. Color green, turning yellow or whitish at maturity, with a thin bloom. Pulp pale rose, opaline, or pale coppery. In a warm climate a sweet and good fig. (According to Hogg.)

Liviana—PISSALUTTO BIANCO.

Lob Ingir—*Bulletin Smyrna*, *Commercial Smyrna*; *Erbeghli*; *Erbelli*; *Erbeili*.—Fruit sulphur yellow when ripe, this color lasting only two days. Pulp pale honey colored without red. Form of fig decidedly flattened, as an onion.

Before full maturity the pulp is streaked red. Requires caprification. The figs of the caprificated Smyrna fig should never be cut from the tree, but be allowed to fall naturally to the ground. The dropping of the ripe figs always occurs at the proper time—that is, when the figs are fully ripe and ready for drying. If the figs are cut from the tree before they are ready to drop they will remain hard and inferior. In order to insure a perfect dried fig the ground under trees should be soft and mellow and there should be no large clods. As soon as the figs have dropped they are at once picked up and examined. Many of them are ready for packing without further drying. In case they are too moist or pulpy one or two days' exposure to the sun should suffice to bring them to the proper state of desiccation for packing. This is the true Smyrna fig of commerce, grown and extensively cultivated in the valley of the Meander near Smyrna. It is a distinct fig, and this and no other fig should be known as Smyrna, if this name is to be used at all. The promiscuous use of the name Smyrna figs can not be too much condemned. (See Smyrna figs, p. 278.)

Long Marseillaise—MARSEILLAISE, LONG.

Long Naples—BROWN TURKEY.

Long Verdal—VERDAL, LONG.

Long Yellow—*Longue Jaune*.—Skin reddish yellow. A long, turbinate fig.

Longue Jaune—LONG YELLOW.

Longue Marseillaise—MARSEILLAISE, LONG.

Lucrezia—COL DI SIGNORA BIANCA.

Lusitanica.—France. Possibly identical with *LAMPEIRA*.

Madame Trille—TRILLE.

Madeleine—MAGDALEN.

Madonna—BRUNSWICK.

Magdalen—*Madeleine*; *De la Madeleine*.—Size below medium to small, about 1½ by 1½ inches, quite round, or slightly pyriform and obtuse. Ribs distinctly prominent and rough, especially toward the stalk, while diminishing in prominence toward the eye, but entirely disappearing immediately around it. Stalk longer than one-half the fig eye open, comparatively large, but depressed; scales very small and few of a pale whitish amber. Skin greenish-yellow or yellow on cheek, greenish in the shade; pulp amber white; meat white. A very delicious little fig, far superior to the *Ischias* and the *Celestes*. (Fig. 72.)

The above description is taken from fig trees imported from France by Mr. Gillet to California and grown in Santa Clara Valley. They differ from those received by the Royal Horticultural Society of London, as seen below. Dr. Hogg gives *Madeleine* as synonymous with *Angelique*, which is erroneous, *Angelique* is a distinct fig of larger size, much more flattened, and of the shape of a flat onion.

Madeleine—*De la Madeleine*.—Size medium; 2½ inches long by 1½ inches wide; pyriform; lopsided. No distinct neck and very small stalk. Ribs shallow, numerous, confluent; eye medium, open; scales large. Skin waxy, cracking, of a yellowish-green color; pulp coarse, rosy amber and pure amber toward stalk end. Vinous and juicy, but not highly flavored. Tree strong grower, with large, coarse, shallow, 3-lobed leaves, about 9 inches long by 8 wide, woolly underneath. This fig was received thus named from the Royal Horticultural Society of London. It is a distinct fig from the true *Magdalen*.

Mahounaise.—Color red. Salon and St. Remi, France.

Malta—*Small Brown*.—Small, roundish turbinate, compressed at apex; pale brown when fully ripe; pulp pale brown. Dries well and becomes a perfect sweetmeat. (Hogg.)

MAPLE-LEAVED SMYRNA. (See Smyrna figs, p. 278.)

Maravilla—PRINCESSA.

Maris No. 2—GOURAUD NOIRE.

Marseillaise—ATHÈNES.

Marseillaise—MARSEILLAISE, WHITE.

Marseillaise, Black—*Black Marseillaise*; *Black Provence*; *Noire de Provence*; *Reculver?* Hogg; *Ficus phoceana* Risso; *Marseillaise Negra* (Provence).—Size medium; shape oblong-pyriform, with a distinct neck; body not flattened at apex; stalk long, about one-third the length of the fig. Ribs distinct, especially toward the neck, gradually disappearing toward the eye. Eye closed, medium size; scales large, red, slightly standing out. Skin waxy and slightly downy, fin. of a dark bluish black, with very thin bloom. Pulp rosy red; meat white, not very finely grained, but good. No large seed. Provence and Nice. This fig is not related to the *Marseillaise, White*, nor to the *Athènes* and does not bear a few large seeds, as do all figs related to *Marseillaise, White*. (Figs. 73, 74.)

Marseillaise, Long—*Long Marseillaise*; *Grosse Blanche Longue*; *Longue Marseillaise*; *Grosse Marseilles*; *Grosse Marseillaise*.—Large, about 2½ by 1½ inches; longer than wide; skin thick, white or greenish with brown shade; pulp dull red; leaves 5-lobed, margins crenate, lobes sharp, pointed. Requires moist soils. A fair fig which dries well. South of France. This fig must not be

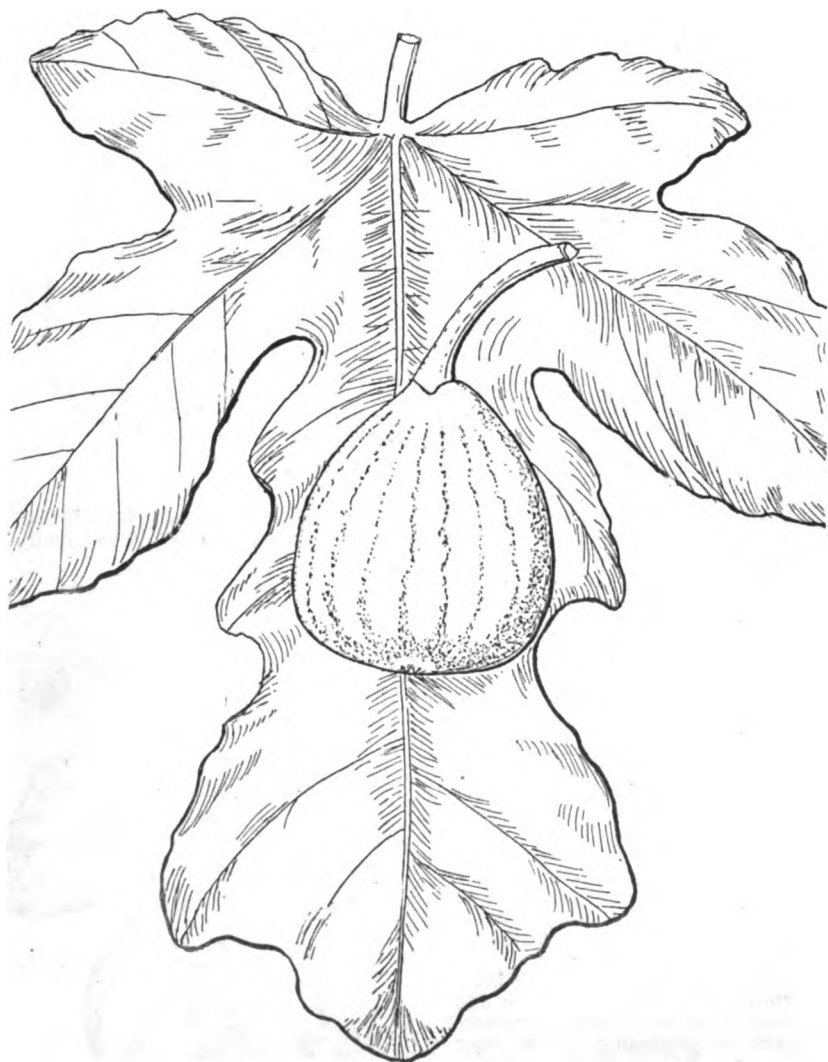


FIG. 72.—Magdalen fig.

confounded with either the Black or the White Marseillaise, as it is not related to either of these figs. The common name "Marseillaise" to all these varieties does not indicate that they are closely related or resemble one another, but simply that they are, or were once, principally cultivated near Marseilles or perhaps originated there.

Marseillaise Negra—MARSEILLAISE, BLACK.

Marseillaise, White—*Marseillaise; Figue de Naples; Naples; White Naples; White Standard; Grosse Marseillaise* (all according to Hogg); *White Marseillaise*.—

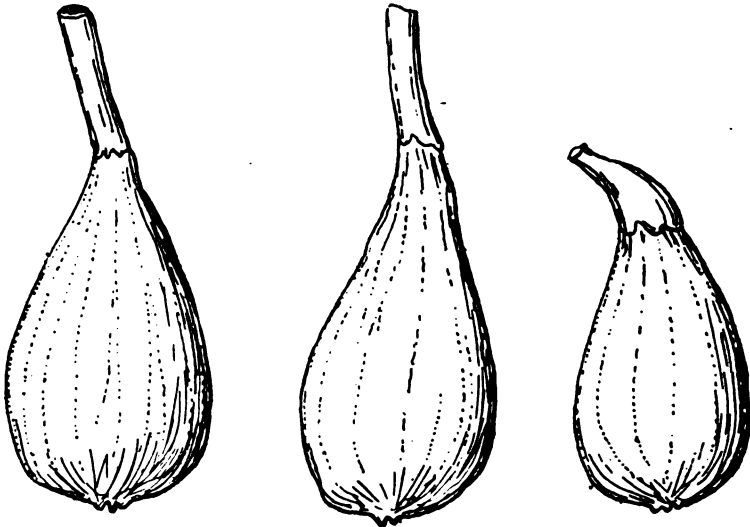


FIG. 73.—Marseillaise, Black figs.

Medium or below medium; ovate, pyriform, or even quite round; 2 by 1½ inches to 1½ inches; neck very short, sometimes smaller; stalk medium. Ribs numerous and distinct, but not greatly elevated, more like very distinct veins. Apex flattened, or slightly rounded at the eye. Eye large, open, but not elevated; scales small, amber green, flat, not standing out. Skin slightly downy, not waxy, mottled, with smaller or larger specks of pale white on a ground color of pale yellowish green, evenly diffused; pale yellow around the apex; when not fully ripe bluish-green. Very light pale bloom. Meat white; pulp amber, transparent, with a few very large seed, very sweet, juicy, and pulpy. One of the best drying figs, though small in size. Extensively cultivated in Provence, France. The Athènes, Marseillaise, White, Raby Castle, and some other figs form a natural group characterized by possessing a few very large seeds, etc. These varieties have been confounded by most writers, one copying the erroneous description of the other without further investigation. Hogg gives as synonyms a number of figs, such as Raby Castle, White Genoa, etc. which are distinct, and some of which do not even belong to the Marseillaise group. The figs belonging to this group are useful for drying, but of medium quality as table figs. (Fig. 75.)

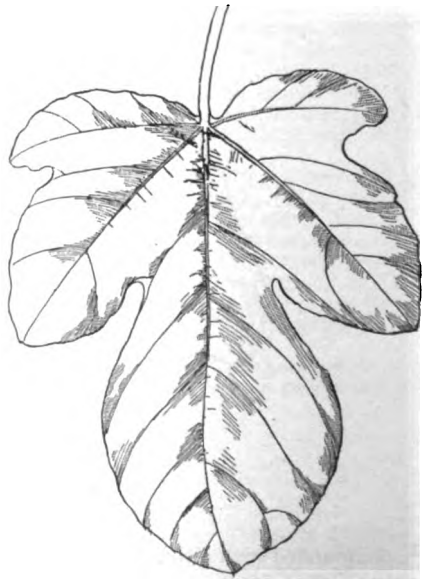


FIG. 74.—Leaf of Marseillaise, Black figs.

Marseillaise—ATHÈNES.

Martale.—Provence.

Martinique—*Black Martinique*.—Below medium; round, with short neck; ribs prominent; eye open; stalk very short; color deep blackish purple; pulp dark red, stiff, and oily. Very good. This is all according to English authors. There is also a white *Martinique*.

Martinique—MARTINIQUE, WHITE.

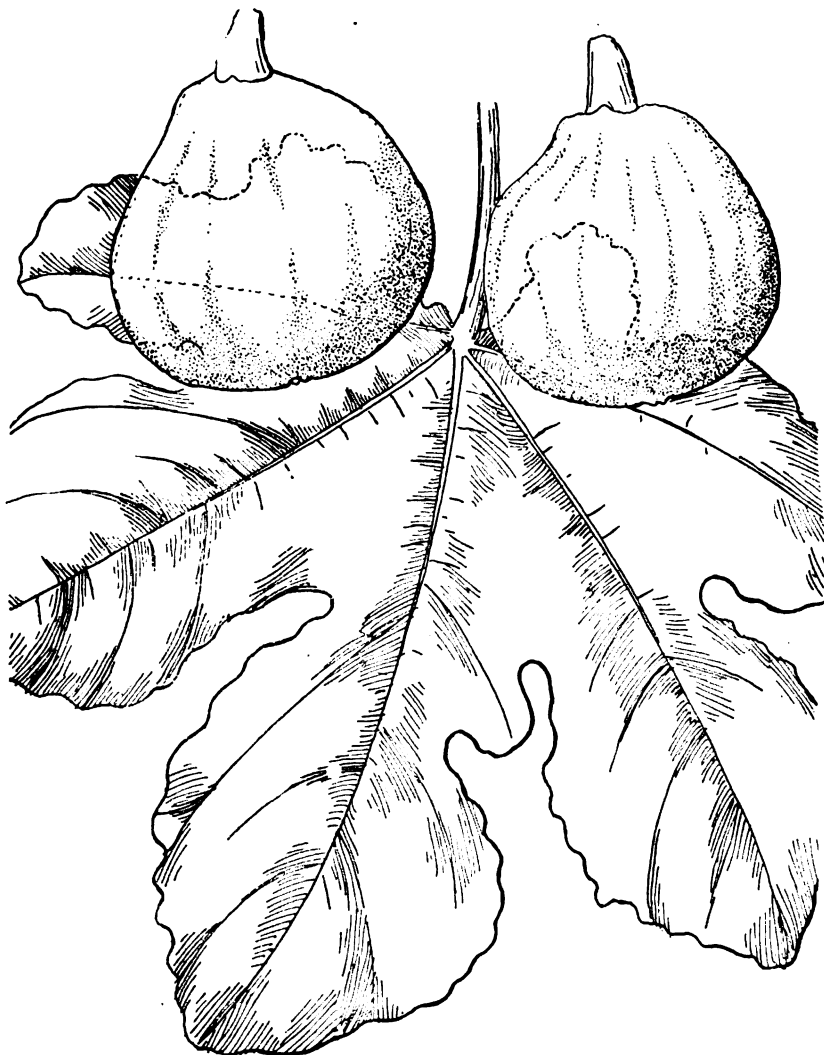


FIG. 75.—Marseillaise, White figs.

Martinique, White—*Martinique*.—White Martinique, small, $1\frac{1}{2}$ inches long by $1\frac{1}{4}$ wide, pyriform; neck short, but very distinct and well set; stalk short or none; cheeks prominent, swollen; ribs very distinct, few, and broad from base of neck to eye: eye open, large, with elevated iris: scales rosy; skin rather rough, yellowish-green; ribs pale violet-reddish, and a reddish or violet flush, which is faint on the sunny side. Violet pale bloom on neck. Pulp rosy red, with few seeds; meat pink. Very sirupy and juicy, and well flavored. Leaves medium, very deeply lobed, lopsided, margins crenated, wavy,

lobes five. This fig is supposed by Rev. W. Wilks to be synonymous with *Angelique*, but this the author considers incorrect. A very heavy bearer. A most excellent fig for canning.

Marzelli.—Violet purple; pulp white opaline. Italy.

Matarassa.—*Figue de Grasse*; *Grasse*; *Grassenque*; *Figue Grise*; *De Grasse*; *Grassale*; *Ficus grassensis* Risso.—Very large, 8 to 9 inches in circumference by 3 inches long; very flattened at apex, else turbinate; neck short; ribs distinct, longitudinal; stalks very short, scarcely perceptible; eye open; skin thin, yellowish white, covered with blue bloom; pulp very dark red; good for drying; leaves 3-lobed, with undulating margins and obtuse lobes. An extremely handsome fig of medium quality when fresh, but better when dried. The tree is a very vigorous grower and requires moist and rich soils. Greatly to be recommended for rich bottom lands.

Matelassa.—*Matelassiera*, *Ficus sylvestris* var. *ventricosa* (Geny).—First crop large, 4 by 2½ inches; lopsided, one side protruding; skin blackish red; pulp yellow. One of the few figs with dark skin and white or yellow pulp. Nice and Provence.

Matelassiera—**MATELASSA.**

Mattaro—**ALBO.**

Mecque.—A French fig for drying and table.

Meirana.—*Ficus meirana* Risso.—First crop very large, brownish black; pulp red. Second crop heartshaped, violet black; pulp rose-colored. Levens on the Riviera, France.

Melette—**ANGÉLIQUE.**

Mentone—**MENTONASCA.**

Mentonasca.—*Figue de Mentone*, *Mentone*; *Ficus erin.* var. *mentonensis* Geny.—Above medium, 2½ by 2 inches; pyriform; with a long neck; skin thin, tender, of a dark violet color; violet meat below the skin; pulp reddish, very sweet. Nice, Mentone, and their vicinity, France.

Mentonensis—**MENTONASCA.**

Meou.—*Figa de Meou* (Provence); *Figue Mielieuse*; *Ficus mellifera* Risso; *Ficus sylvestris* var. *smyrna* Geny; *Honey fig*.—Two crops: First crop large, turbinate, 2 to 2½ inches diameter; skin thin, cracking, greenish-yellow, violet below the skin; eye projecting; pulp red; very good. Second crop globular, smaller, about 1½ to 2 inches diameter; pulp red, paler than first crop; good for drying, but inferior when fresh. This fig was considered by Geny as identical with the true Smyrna fig, which is erroneous. It is cultivated in Savoy, at Nice, and other places.

Merengiana.—*Ficus melitensis* Risso; *Ficus erin.* var. *melongena* Geny.—First crop oblong-ovate, largest at the apex; skin thin, cracking, of a blackish-violet purple; meat violet streaked; rather sweet. Nice and the Riviera.

Merioun.—*Figa a Merioun* (Nice); *Fico fetifero*; *Fico dall' Osso* (Italy); *Ficus erin.* var. *fetifera* Geny; *Ficus nucleata* Risso.—Two crops: First crop 2½ to 3 inches in diameter, sometimes bell-shaped, flattened; dark violet color, or greenish yellow, striated violet; sometimes contracted at the middle like a gourd, the apex part being dark violet, the stalk part being greenish yellow; eye very large, open, emitting one or more small figs similar to the mother fig; pulp red, sweet, agreeable, but dry and hard around the eye. Second crop smaller, but with similar characteristics. The monstrosity of this fig is similar to the one found, for instance, in roses, where the axis is prolonged, forming a new rose; or as in certain citrus fruits, such as the navel orange, etc. A curious, but not a valuable fig. Rare. Nice and Provence.

Merlinga.—*Ficus erin.* var. *gemina* Geny; *Twin fig*.—Below medium; 1½ inches diameter, turbinate; color brownish black, fine violet at the stalk and neck; neck long and very slender; pulp red. Nice and Provence.

Messongue.—Very large. At Salerno, France.

Mezzith.—A black fig from Kabylia which requires caprification.

Migliavolo.—Italy.

Minna—**SAN PEDRO, BLACK.**

Minna di Schiavo—**SAN PEDRO, BLACK.**

Mission.—*Black Mission*, *Black California*, *California*, *Black Mexican*.—Two crops: First crop or brebas large to medium; long turbinate with the greatest diameter between the center and the apex, which is rounded, sometimes even pointed, causing the shape of the fig to become ovoid. Neck long, gradually set; stalk medium to short; ribs distinct, well marked. Eye prominent, raised, open, but not very large; scales rosy. Skin rough, slightly hairy or downy, deep mahogany violet with reddish flush in shade and on stalk covered with a thin bloom. Pulp not fine, red, but not blooded, rather brownish-amber red, shaded dark amber; sweet, but not flavored. The tree



MISSION FIG TREE, CALIFORNIA.

is a good grower, with the lower branches drooping, and light bark. Leaves 5-lobed, glossy, longer than broad and lighter green than most other figs, and most characteristically mottled with lighter, yellowish green. A coarse fig, which, however, thrives and bears well almost everywhere. It dries well and when dry is rather of pleasant quality and seems especially adapted to California and Arizona, where it is extensively distributed. Also common in Sonora and Baja California, and probably in other of the Pacific States. Introduced by the Franciscan missionaries in the eighteenth century. There is only one variety of Mission fig. The general belief that the Mission is a distinct California fig is erroneous. We can no more lay exclusive claim to this fig than can Mexico and Chile. It was undoubtedly brought from Spain or Portugal at a very early date after the conquest. The early padres and missionaries in the Pacific coast States cultivated no other variety of fig. (Pl. XV.)

Moissao—MOISSOUNA.

Moussonne Noire—MOISSOUNA.

Monaco Bianco.—*White Monaco*.—Large, 2½ by 2 inches; shape rounded, turbinate, flattened. Neck small, but very distinct and well set; ribs numerous, slightly elevated, narrow, but very distinct down to the apex, but not so marked on neck. Eye very open, scales large, dark amber, iris slightly elevated from a surrounding depression, with faint color of dark green; skin dark bluish-green, even all around, or the shaded side only slightly paler in sun, mottled with dark amber. Thin bloom; pulp dark rose; meat amber yellow. A very good, juicy fig, splendid for table; does well at Niles, Cal. (Fig. 76.)

Monais.—Second crop above medium, globular, but compressed; color ashy violet, somewhat bronzy; skin thick; pulp brown. Good.

Monege blanche.—France.

Monginence—DOUQUEIRA NEGRA.

Monnoire.—Medium; rounded; green. France.

Monstreuse.—Medium, about 2½ by 1½ inches wide; turbinate, with a short, thin neck, bent and well set; no stalk. Skin smooth, with faint, irregular, and crenated ridges; apex flat; eye medium to small, open, with erect scales. Skin waxy, covered with a fine bloom around the stalk and ending sharply before the equator is reached. Color uniform pale green; pulp brownish salmon, dense, vinous, but not highly flavored. Leaves large, about 10 inches, 3-lobed, without spurs, very coarse underneath. This fig is said by Rev. Dr. W. Wilks, secretary Royal Horticultural Society of London, to be identical with *Grosse Monstreuse de Lipari*, but the fig sent by him and from which the above description is taken is not identical with that fig, which is said by Hogg to be brown in color.

Montegas.—Above medium. A drying fig.

Moresca.—*Gentilla Roussa* (Nice); *Ficus sylvestris* var. *mauritanica* Geny.—Two crops: First crop very large, 3½ to 4 inches by 2½ inches; pyriform, lopsided, with a very long neck. Color bright gray; eye star shaped, raised, red; pulp pale red or yellowish. Grown around Nice, France, and supposed to have been introduced from Algiers.

Morlaise.—Very large. France.

Moscadello—ALBO.

Mouissouna.—*Moussonne Noire*; *Bouissonne*; *Mouissonne*; *Moissao* (Nice); *Mouissone* (Italy); *Moussonne Noire* (Provence); *Ficus mouissouna* Risso; *Ficus erin* var. *salsula* Geny; *Figue violette* N. Duhamel.—Two crops: Second crop almost globular, turbinate, 1½ inches long by 2 to 2½ inches wide; broader than long, flattened at apex. Skin thin, fine, tender, of a blackish violet color, with blue bloom. Eye reddish; pulp red, soft, very sweet and like a date in taste. Best of all the early figs, but inferior to *Barnissotto Black*, which, however, is later. Leaves 5-lobed, crenate, lobes acute. First crop longer, very few. Requires a soil neither too dry nor too wet; in the former the figs would drop and in the latter they would become of poor taste. (Fig. 77.)

Mouissone—MOISSOUNA.

Moussonne—MOISSOUNA.

Moussonne Fugia.—A variety of MOISSOUNA.

Moussonne Noire—MOISSOUNA.

Mourenao.—*Bagassa* (Villa Franca); *Ficus mourenao* Risso; *Ficus sylvestris* var. *olivula* Geny.—Small, 1½ inches diameter; almost globular; skin thick, cracking, blackish violet; pulp red, medium quality. Nice and Provence. According to Duhamel there is a *Mourenao* with oblong fruit and white pulp; leaves 3-lobed, obtuse, undulating, though I believe an error was made in describing the pulp and that both descriptions refer to the same variety.

Murrey—BROWN TURKEY.

Mussega—*Cougourdane*; *Ficus linneana* Risso; *Figue Reine Duhamel*; *Cougourdane* Geny; *Mussega Bianca*; *White Mussega*.—Second crop medium, about $2\frac{1}{4}$ by $1\frac{1}{2}$ inches; shape pyriform, largest at apex and with a narrow neck, but less so than *Tapa Cartin*. Skin thin, greenish white, spotted; red star-shaped eye; pulp lively red, of agreeable taste. (September to December.) Nice, Aix, and St. Remy, France,

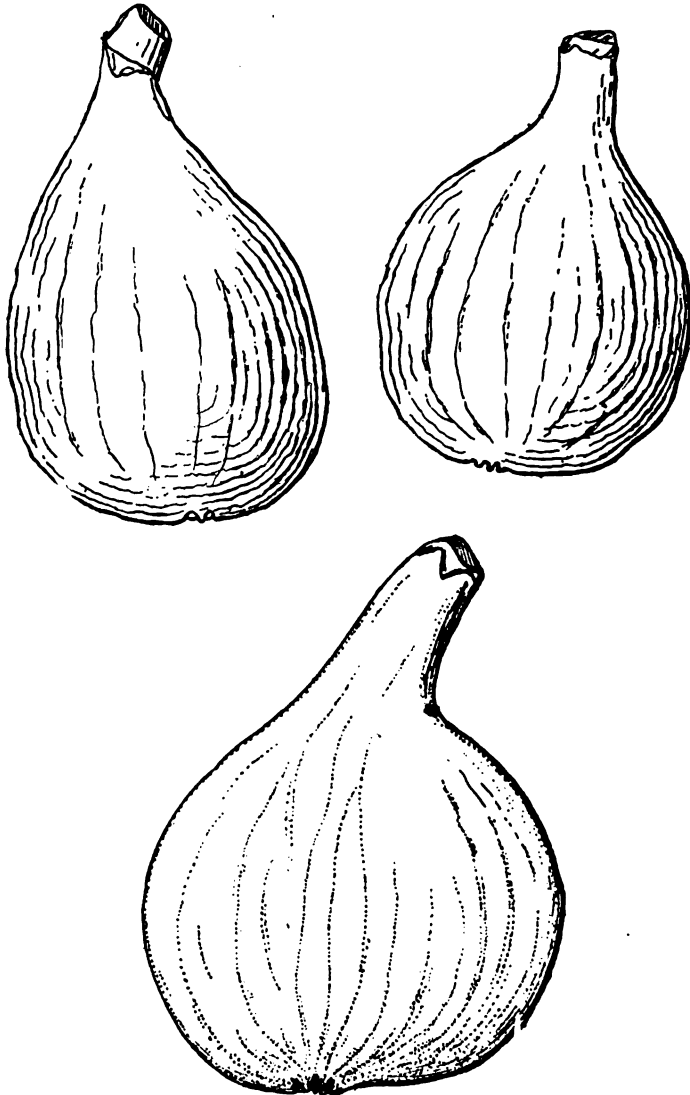


FIG. 76.—Monaco Bianco figs.

Mussega Bianca—MUSSEGA.

Mussega Negra—*Ficus punctulata* Risso; *Black Mussega*.—A variety of the preceding with skin first a bright green, dotted with white, later turning to a dark blackish violet. Provence, France.

Naples—MARSEILLAISE, WHITE.

Napolitain—NAPOLITAN.

Napolitan—*Napolitano*; *Napolitain*.—Two crops: First crop large, egg-shaped, oblong, with deep longitudinal ribs; skin pale yellow, thin; pulp coarse, but juicy, white. Second crop one-half smaller, turbinate; color brilliant green at base, violet toward the crown or apex; skin thin; pulp very fine, oily, sweet, red. A very good fig, suited to drying. Is much dependent on the locality where grown and varies from very good to poor.

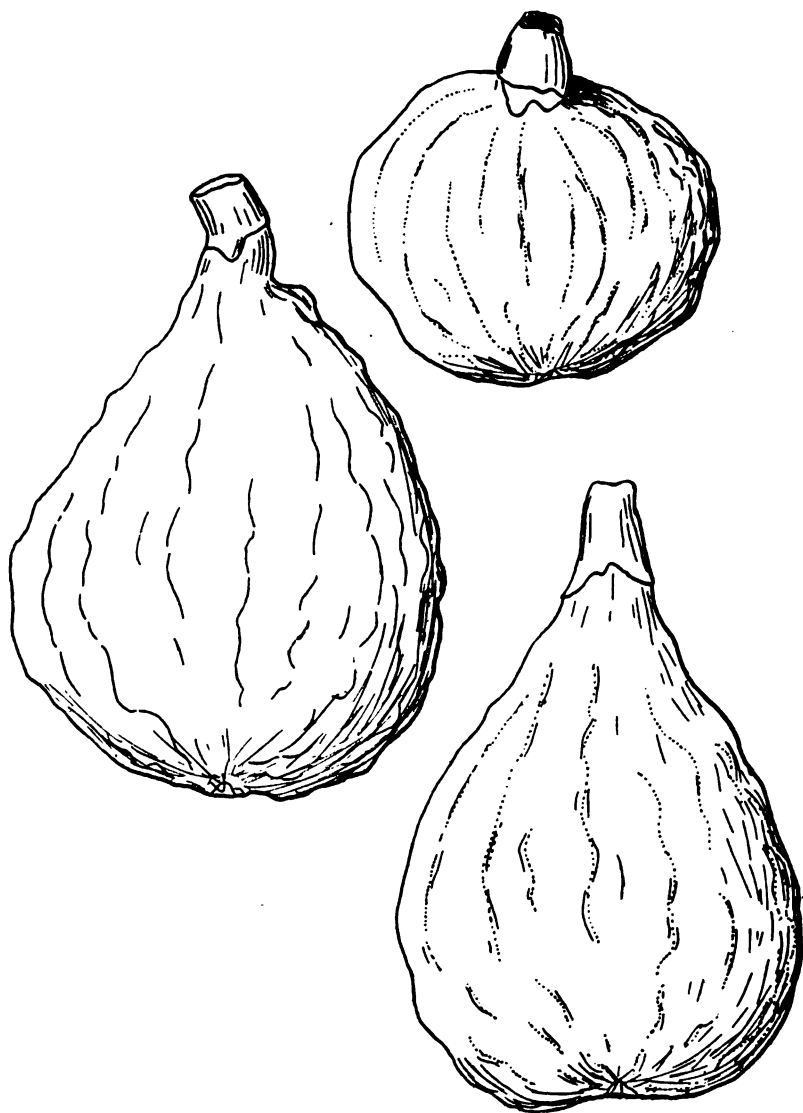


FIG. 77.—Mouissouna figs.

Napolitani—**DOTTATO**.

Napolitano—**NAPOLITAN**.

Natalino—*Della Cava*; *Tre Volte*; *Pasquale*; *Christmas Fig*; *Winter Fig*.—A fig which ripens very late all through the winter, withstanding the frost, at Naples, and ripening after the leaves of the fig tree have fallen. Probably identical with Kargigna.

Nebian—**ADRIATIC**.—There seems now to be no doubt but that the *Nebian* and *Grosse Verte* are identical with the Adriatic of the California growers. The description given by Dr. Hogg tallies exactly with our Adriatic. Trees received from the Royal Horticultural Society in London under the name of *Nebian* and *Grosse Verte* and grown on the place of John Rock at Niles, Cal., resemble exactly our Adriatic figs. Our Adriatic fig, however, is now so well known that a change of name can not be desirable. This variety is, among other things, characterized by a peculiar, and not always desirable, "burnt" taste, especially prominent in the dried fig. This taste was also found in the *Nebian* and *Grosse Verte*, and the author considers it absolutely beyond any question that these three varieties are identical. If a change should be made in name, the word *Nebian* should be preferred.

Negrau—*Figa Negrau* (Nice); *Ficus sylvestris* var. *rufescens* Geny.—Second crop: Two inches by five-eighths inch; pyriform, reddish brown; meat violet; pulp red. Nice and Provence, France.

Negretta—*Ficus nigra* Risso; *Ficus erin.* var. *saxetana* Geny; *Rock Fig*.—Two crops. Second crop medium; about 2 inches long by 1½ inch wide; egg shaped, rounded, similar to a small Douqueira. Color shining black, with blue bloom; skin thick, firm, adhering to the pulp, which is pale yellow and of good quality when fully ripe. Many seeds. Thrives well in the rockiest places, where no cultivation is possible and where no other tree except the olive would thrive. Nice and Provence. Is recommended for places in Arizona and southern California where irrigation is impossible.

Negro d'España—GENOA, BLACK.

Negro Largo—SAN PEDRO, BLACK.

Negrone—*Negronne*.—Size medium to below, 2 by 1½ inches. pyriform, tapering with a distinct, slender, variable neck. Stalk distinct, long; stalk and part of neck bent over and rising in a curve upward, where the fig hangs down. Ribs few, distinct, disappearing on apex, which is rounded; eye small, closed; scales few, large; small iris. Skin smooth, except for the ribs; color deep violet-black; pulp fine, dense, with small seed; meat violet-white, pulp brownish red to amber with violet flush; inner scales ochre yellow. Tree a strong grower. Leaves long, about 9 by 6 inches, very deeply lobed, the middle lobe being much the longest; three deep large lobes and two shorter ones near the base of the leaf. Under side rough. A very good little fig. It is not identical with the *Violette de Bordeaux*, as suggested by Barron. This latter fig has small leaves, otherwise the fruit is very similar.

Negronne—NEGRONE.

Nero Oblungo—SAN PEDRO, BLACK.

NIBRAN—*De Nibran*.

Nigra.—Small, pyriform; skin dull yellow, shaded purple; flesh bright red, juicy, not rich (Barron). This is undoubtedly a variety brought to England under a wrong name, as it is difficult to understand how a "dull yellow" fig could be called *Nigra*. It is only another instance of the mixing of names. The variety is entirely distinct from *Nigra*—Genoa. Black.

Nigra—GENOA, BLACK.

Nigrette.—Very small, oblate, with short neck; stalk one-eighth inch long; eye open; skin dark blackish purple over the apex and halfway toward the stalk, where it shades off to reddish purple. Pulp rose colored, juicy, and sweet. Not identical with *Negretta*.

Noire d'Espagne.—Extremely early, small, round, and regular, stalk short; eye closed; red ribs; skin quite black, with thick blue bloom, cracking when ripe; pulp tender, deep rose. A handsome fig of fair quality (Hogg). A different fig from *Negro d'España*—GENOA, BLACK.

Noire d'Espagne—GENOA, BLACK.

Noire de Languedoc—SAN PEDRO, BLACK.

Noire de Provence—MARSEILLAISE, BLACK.

Noiremoutier.—Two crops; medium, oval; color yellow with red stripes. A very rich table fig from the valley of the Loire, France. Introduced into California by Felix Gillet, of Nevada City, Cal.

Nubian.—Probably another spelling for *Nebian*—ADRIATIC.

Observantine—COTIGNANA.

Observantine—SERVANTINE.

Observantière Grise—COTIGNANA.

Œil de Perdrix—PHEASANT EYE.

Ome—*Figu d'Ome*; *Ficus richeta* Risso.—Medium or below; 1½ to 2 inches diameter; eye red, with green iris; skin violet-black; pulp bright purple-red. Nice and the Riviera.

Osborn Prolific.—Very large; about 4 inches long; rounded turbinate; tapering into a very long neck. Skin dark mahogany, gradually shading off to pale brown toward the neck, which is bright pea-green, with the surface thickly spotted with gray and white. Pulp opaline with no trace of red. A rich, sweet, and highly flavored fig. According to Hogg this fig was introduced to England by Mr. Osborn, of Fulham, in 1879. The original name is not known, as the fig has not been identified with any foreign variety.

Ovato—CARAVANCHINA NEGRA.

Pacific White.—Local name, given by Messrs. W. R. Strong & Co., of California. Medium or small; rounded turbinate; stalk very short; no neck; many shallow ribs. Skin greenish yellow, somewhat downy. Pulp coarse, amber white, with large seeds. Sweet, but poor flavor. Tree a poor grower; rounded head. Leaves small, stiff, 3-lobed, bright green, with fine down. This fig belongs to the Marseillaise class, characterized by its large seeds, but is smaller than and inferior to the true Marseillaise, which it otherwise resembles.

Pagaudière.—Two crops. Round, reddish yellow, with red streaks. A very sweet French fig for table, extensively grown in the valley of the Loire, in France, according to F. Gillet, who introduced it to this country.

Palopal.—Very large fig of white color, grown in the vicinity of Valencia, Spain.

Panachée—Striped.—Medium; round; skin bright, dark green, striped yellow. Pulp white. A very handsome striped fig, probably the same as Jasper, with the description of which it agrees. Leaves and stems of these figs are distinctly striped.

Panachée—COL DI SIGNORA PANACHÉE.

Paradise Fig—PARADISO.

Paradiso—*Paradise Fig*.—Only first crop said to be valuable.

Parker's Smyrna—ADRIATIC.

Pasquale—NATALINO.

Pastellière—Pastidière.—Size, about 3 inches long by 1½ inches wide; shape, elongated pyriform, with long, gradually tapering neck; cheeks swollen and protruding; stalk short or medium; ribs hardly elevated, and in ripe figs not distinct. Eye closed, but rather prominent, with an elevated iris, rough; scales few, but comparatively large, dark violet, with rosy margins. Bloom can not be rubbed off. Skin rather rough, hairy, covered with a thick, fine, pearl-blue bloom, extending to the eye. Color dark violet-blue all over; pulp dark red, sweet and good; meat white. A good fig for preserves. Does well at Niles, Cal. Tree erect, with stiff limbs. Leaves very large, almost circular, coarse and flat, shallow, 3-lobed or entire. If the writer could plant only one blue variety it would certainly be this fig. The fine form of the tree, its abundant cropping, and the superior quality of the fruit should make this fig a favorite all over the Pacific coast. (Fig. 78.)

Pastidière—PASTELLIÈRE.

Peau d'Ane—PEAU DURE.

Peau d'Ane Noire.—A variety of the following, with blackish-violet skin. Very fertile.

Peau Dure—Peldure; Verte Brune; Peau d'Ane.—Medium or above medium; 3 by 1½ inches; pyriform, with short neck, well set; tapering; stalk short; ribs very distinct, rough, uneven; cheeks lopsided, swollen; skin green, with brown tint, turning obscure. Pulp bright rose, coarse, but good. Leaves small, 3-lobed, with very slender stalks.

Peconjude Grise—PECONJUDO.

Peconjudo—Peconjano; Pedonculée; Ficus longicaudata Risso (Histoire de Figuières); *Peconjude Grise*.—Oblong, rounded; very narrow but long neck; color glaucous, shaded yellow-green; pulp red. Good fresh and dry. Grasse and Antibes. Provence.

Peconjano—PECONJUDO.

Pedonculée—PECONJUDO.

Peldure—PEAU DURE.

Peloua—Pelouas (Provence); *Cortice Crasso; Setosa; Velvet Fig; Ficus erin.* var. *eriocarpa* Geny; *Ficus pilosa* Risso; *Velue; Perouas* N. Duhamel (probably an error for Pelouas).—Above medium; 1½ to 1½ inches by 2 to 2½ inches; rounded, but longer than wide; of a violet-brown color, rather intense, and with reddish shade. Skin tender, but thick, bright green, covered with a thick, whitish fuzz. Fig strongly adherent to the stem. Pulp pale yellow to pale rose. Does not suffer from coulure; produces well, and thrives equally well on dry and moist soil. Leaves 5-lobed, pointed, and crenate. This is a valuable fig, as it is a good and regular bearer.

Pelouas—PELOUA.

Pergussata—*Pregussata*.—Fruit small, round, compressed at the apex; skin purplish brown in the shade, dark brown, covered with pale spots on the side exposed to the sun; pulp deep red, rich, and luscious. August to October. (Hogg.) This is probably the true *Pergussata*, received from England under that name, in which case the fig introduced by J. Rock should bear another name. (Figs. 79, 80.)

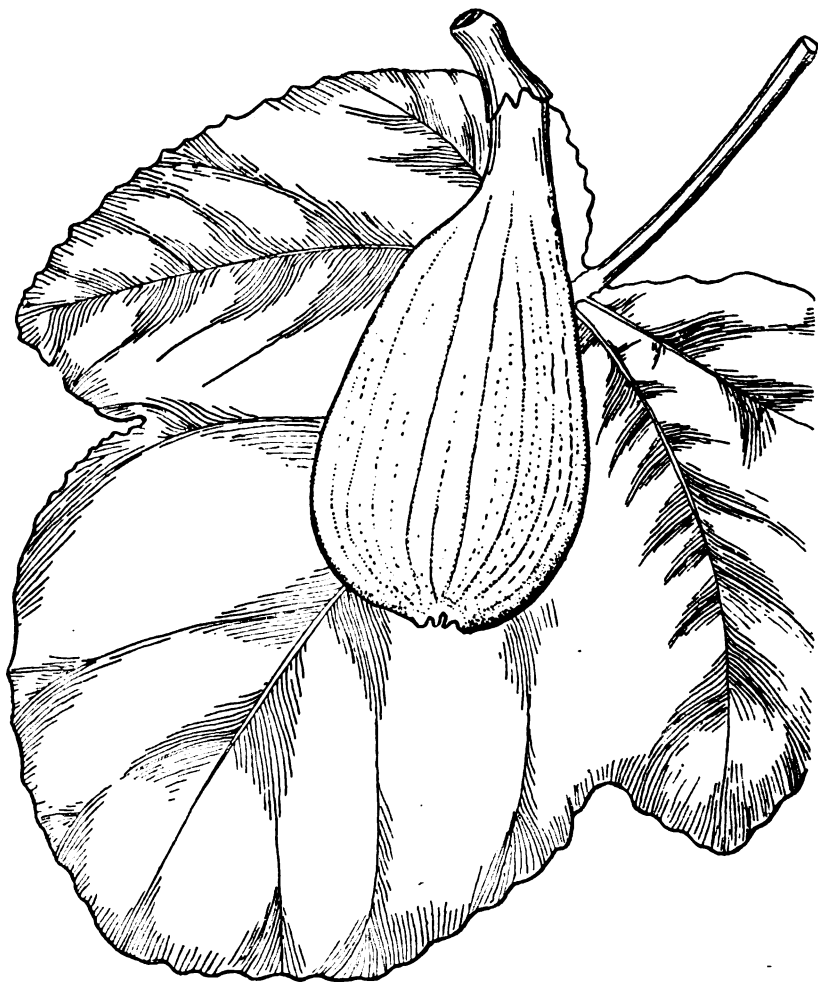


FIG. 78.—Pastellière fig.

Pergussata.—Size $3\frac{1}{4}$ by $1\frac{1}{4}$ inches; pyriform; lopsided; neck long, but narrow; stalk rather long, one-half inch. Ribs broad, distinct, wavy, but not branched; eye flat, small, pale brown, with slightly elevated iris. Skin smooth or somewhat warty along the ribs, apex flat or concave. Skin pale violet-brown on cheek, lighter-shaded yellow in the shade, darker around the eye; stalk and neck greenish yellow; pulp red or rose, shaded amber. Meat under the skin greenish yellow. The name is doubtful.

Peroquina—DOUQUEIRA NEGRA.

Perroquine—PERRUQUIER.

Perruquier—DOUQUEIRA NEGRA.

Perruquier—Perroquine: *Violette Perruquier*.—Medium, oblong; stalk short; eye open; ribs obscure; skin very dark black, with white bloom; pulp deep red, stiff, and sweet, but not highly flavored. First crop 2 by 1½ inches; leaves 5-lobed, crenate, acute. Requires dry soils. Valuable on account of its brebas, which are very fine. (Fig. 81.)

Perous—PELOUA.

Peters White.—Size medium; flattened or turbinate; about 2½ inches each way. No neck and stalk as a rule, though some figs have a slight neck; ribs low, bent quite distinctly around the stalk end and the eye, though nearest the latter there is a smooth zone. Skin waxy, mottled with small whitish specks, ground color green with yellowish ribs; eye large, open; scales rough, standing out, amber, tipped brown; eye flat or sunk. Cheeks rather uneven, protruding. Bloom bluish, thin; meat yellowish white, especially under the skin, but not thick. Pulp dingy pink, fine, sweet, and delicious, with a fine acid. One of the very best white figs as far as regards the first crop. Second

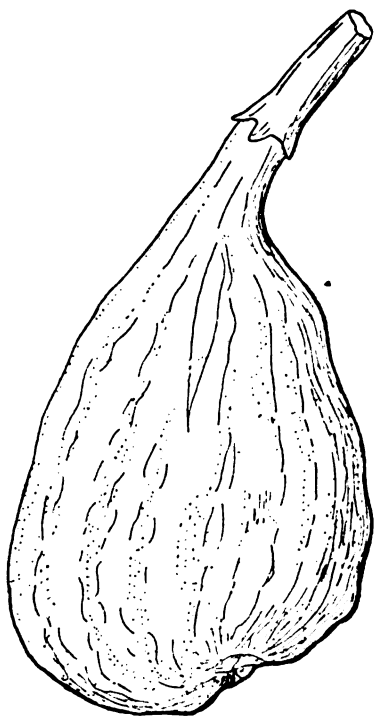


FIG. 79. Pergussata fig.



FIG. 80.—Leaf of Pergussata fig.

crop, medium, pulp less pink, more amber, smaller than Adriatic, but sweeter, and never becomes sour, at least not at Atwater, Cal. A delicious fig, which the author has not been able to identify with any of the foreign kinds, though it undoubtedly comes very near to Verdane. Fully ripe fruit sent from San Joaquin Valley, California, June 26. It is probable that this, as well as "Atwater," belongs to the importations of fig varieties by the late G. N. Milco. The Peters White ripens about one week later than Atwater. Named for J. D. Peters, in whose orchard the trees were found.

Petite Aubique—BORDEAUX.

Petite Aubique Violette—BORDEAUX.

Petite Blanche Ronde—LIPARI.

Petite Figue Violette—BORDEAUX.

Petite Verdale—VERDAL, ROUND.

Petite Violette—Petite Violette des vignes.—Small, oblong; dark violet; leaves 3-lobed. Similar to ROSE NOIRE, but smaller. May prove identical with Black Ischia, France.

Petite Violette des Vignes—PETITE VIOLETTE.

Pheasant Eye—*Ceil de Perdrix*.—Medium, variable turbinate or pyriform, $2\frac{1}{4}$ inches long by $1\frac{1}{4}$ wide. Short but set neck; short or no stalk; lopsided. Eye small, closed; skin faintly ribbed, rather waxy; color deep brown, greenish on neck; pulp dull coppery amber, with a tint of salmon. A well-filled fig. Leaves below medium, coarse, 3 or 5 lobed, about $7\frac{1}{2}$ by $7\frac{1}{2}$ inches. This fig was received from the Royal Horticultural Society of London. It neither agrees fully with the description given by Dr. Hogg, nor does it correspond with the description given by French nurserymen.

Pichotte-Barnissotto—SAREIGNE.

Pied de Bœuf.—Size medium to large, $2\frac{1}{4}$ by $1\frac{1}{4}$ inches to $1\frac{1}{2}$ inches; shape oblong pyriform, with long, narrow, curved neck; stalk medium to long; skin rough, warty, with warty ribs, distinct both at apex and on neck; eye closed, small, surrounded by a rough, warty, elevated iris, of the same color as the skin, but surrounded by a lighter zone; scales large, violet; skin violet, chocolate brown, in some greenish olive in shade, with more yellow between the ribs. Thin blue bloom near the stalk. Color is diffused, apex and neck are not lighter colored; pulp amber yellow, slightly rosy; meat greenish yellow. A very good fig, remarkable on account of the color of its pulp, which is amber, while the skin is dark. The pulp, however, is quite coarse, though juicy. Tree an irregular spreading grower; leaves 3-lobed. Fruit ripens late.

Pignette.—A small Italian fig.

Pingo de Mel.—First crop: Above medium; largest figs are $2\frac{1}{4}$ inches wide by 3 inches long, pyriform, with a short and very thin but still distinct neck. The neck is narrow; about one-fourth inch wide and even throughout; about three-fourths inch long. Greatest transverse diameter is below the center of the fig; stem short; skin smooth, waxy, pale green. Ribs indistinct, consisting of numerous lines; eye small, with large scales of amber color, margined white. Male zone distinct, but small; pulp whitish amber; male flowers around the throat and also scattered in the cavity of the receptacle, but few in number. Growth of tree sturdy, dense. Leaves medium to large, 5-lobed, rounded. Lobes rounded, deeply cut; but, as the lobes are wide and overlap each other, the sinuses between them are not very distinct. Stem of leaves as long as the leaves. This is a very good and juicy fig and one of the best green brebas. This fig variety belongs either to the class of the Cordelia fig, having male flowers with pollen, or to the class of edible capriffs. It possesses numerous gall flowers in the cavity of the receptacle, but at this writing I have not yet found out if these galls are capable of sustaining wasps. At Niles this fig has never matured a second crop. As soon as it sets this year it will be caprificated, and it can then be determined with certainty to which class this fig belongs. At present I am inclined to consider it as an edible caprifi. (See description of this variety under Caprifi, p. 281.)

Piombinese—SAN PEDRO, BLACK.

Pissalutta—PISSALUTTO BIANCO.

Pissalutta Negra—PISSALUTTO NEGRO.

Pissalutta—PISSALUTTO BIANCO.

Pissalutto Bianco—*Pissalutta*; *Pittalussa*; *Poussouluda*; *Pitaluffe*; *Pissalutto* (Italy); *Ficus carica* var. *ligurica* Geny; *Liviana*, Pliny?—Size $1\frac{1}{4}$ by 2 inches or over; medium; about one-half the weight of Dottato. Shape ovate-pyriform, the greatest width at the center. Neck medium, but very slender;

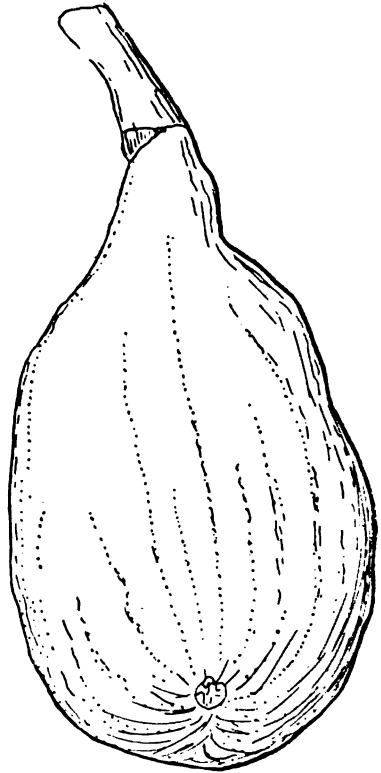


FIG. 81.—Perruquier fig.

ribs very low or indistinct; eye small, scales open, bright red. Skin smooth, thin, waxy, greenish yellow in the shade, with a brownish-amber flush quite similar to that of White Bourgasotte. Meat white; pulp very lively rosy red, of the finest quality. Leaves large, 5-lobed, longer than broad, points sharp, and cuts are medium deep. The end lobe considerably longer than the other. Growth vigorous; branches quite slender and not much branched. Most leaves are 5-lobed, but some also 3-lobed; the leaf stalk is rather long. Very few, if any, brabas; second crop fair. A very fine drying fig, the best Italian fig for table, according to Gallesio, and the best next after Dottato for drying.

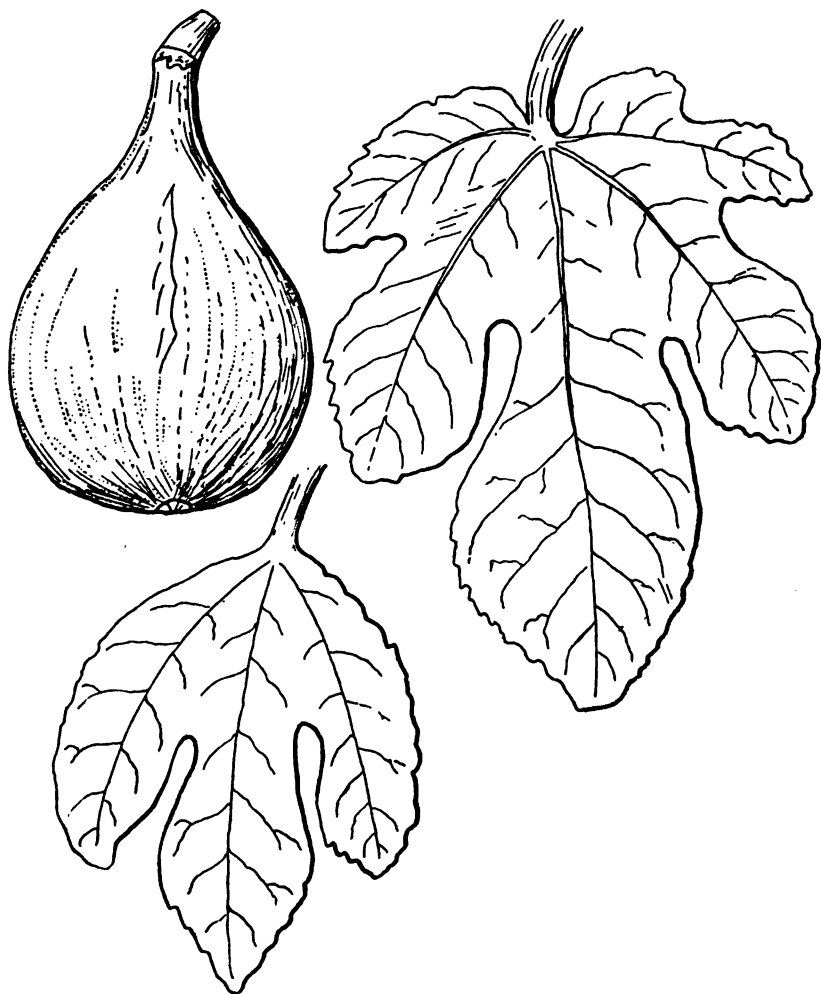


FIG. 82.—Pissalutto Bianco fig (second crop).

Common in Liguria and around Genoa, and especially fine at Sarzanese; also in Corsica and Sardinia. At Grasse, in Provence, known as *Pitaluffe*. Its period of maturity is short. It ripens after Albicello and Bineletto, and is succeeded by Dottato, Rubado, and Bourgasotte. One of the best of all figs. It is supposed to be identical with the *Liviana* of Pliny, which identification must be considered highly doubtful. (Fig. 82.)

Pissalutto Negro—*Black Pissalutto*; *Ficus saffrenia* Risso; *Pissalutta Negra*.—Size medium; less oblong than Pissalutto Bianco; skin shiny, violet ribbed; pulp fine and sweet. A fine black fig grown around Genoa (according to Gallesio). Inferior to Pissalutto Bianco.

Pitaluffe—PISSALUTTO BIANCO.

Pittalussa—PISSALUTTO BIANCO.

Pittilonga—SAN PEDRO, BLACK.

Porto-De Porto.—A black fig, tree dwarf. For table and drying. Seyne, St. Maximin, etc., France.

Portoghese—LAMPEIRA.

Portugal, Black (provisional name).—Largest fig known. About 4 inches wide by 5 inches long; pyriform. Short neck and very short stalk. Eyes small, open, with very small black scales. Ribs narrow, indistinct. Skin otherwise smooth. Color deep violet black, greenish around the stalk end. Pulp violet strawberry red. Meat white with violet streaks. Pulp not finely grained, but very sweet and highly flavored. One of the handsomest figs grown and one to be recommended for market. Bearing quality very good from early to late. Tree a straggling grower and not dense, the limbs spreading in all directions, allowing plenty of air and sun among the branches. Leaves medium to small, oblong, with 3-pointed lobes and sometimes with 2 additional small basal lobes. This fig was brought from Portugal by emigrants to Niles, Cal., where it is now growing. The true name of the variety is unknown to me. Possibly the same as Dourou.

Poulette.—First crop small; fruit medium or above medium; ovate or rounded, with short neck; stalk short; skin ashy green; pulp bright rose. Good. Second crop one-half smaller; eye closed, ashy green with gray bloom. Pulp dark red, quite juicy, and sweet. Tree medium; leaves medium, deeply 3-lobed. Good for drying; stands the rain well. Tarascon and Salon, France.

Pouchuda—*Ficus acuta* Risso; *Ficus sylvestris* var. *praelonga* Geny.—Two crops; second crop medium; 2 by 1½ inches; oblong, gradually tapering to the stalk; neck long; skin pistachio green to yellowish; pulp reddish yellow, sweet, and honeylike in taste. Nice, France.

Poussouluda—PISSALUTTO BIANCO.

Précoce d'Espagne—TRIFERO.

Pregussata—PERGUSSATA.

Princessa—*Figa Turca*; *Figa Maravilla*; *Figa Princessa*; *Ficus radiata* Risso; *Ficus carica* var. *lunata* Geny; *Turca*; *Princess Fig*; *Maravilla*.—Second crop: Turbinate, rounded at apex; skin longitudinally divided in regular bands alternating green and bright yellow; eye large, raised, red; pulp bright red; good. A very handsome and fine fig. Provence and Savoy, France.

Princess Fig—PRINCESSA.

Purple—BROWN TURKEY.

PURPLE SMYRNA. (See Smyrna figs, p. 279.)

Quarteria.—Size medium, about 1½ inches long by 2½ inches wide, though sometimes not wider than long; turbinate or flattened like an onion. Few distinct ribs; no neck and stalk; eye small, but open; scales few and short; skin waxy, shades of green, with a fine gray bloom around the neck end, but which does not extend to the cheek, the bloom ending with a sharp margin. Eye rosy amber, with rosy iris; pulp coarse, bright but pale rose; meat amber. A good, highly flavored, and juicy fig. Fine for drying. Tree strong; round head with very dense leaves closely set on limbs. Leaves oblong, about 9 inches long by 7 inches wide, rather deeply 3-lobed, sometimes entire.

Quasse Blanche.—A reddish-gray fig, cultivated at Baudal and Seyne, France.

Quotidienne—DATTE QUOTIDIENNE.

Rabbit Blood—SANG DE LIÈVRE.

Raby Castle.—Fruit about medium or below medium; rounded, obtuse and flattened at apex; no neck, but long stalk; eye small; skin coarse, with very prominent ribs which are rather irregular; color greenish white; no bloom; pulp coarse with a few very large seed; color, white amber; sweet, but no flavor. A poor grower. Leaves small, thick, 3 to 5 lobes, and rough, with very long stalks, which are often considerably larger than the leaf. Belongs to the Marseillaise group, but is much inferior. Dr. Hogg is in error in classing this fig as a synonym of the Marseillaise. It is much coarser, with heavier ribs and with a white pulp, and the tree is less densely covered with leaves. In the interior of California Raby Castle is an inferior fig. In the vicinity of San Francisco Bay it is sweeter, but still always very coarse, and the author thinks it is not worthy of cultivation in this country, where so many better figs are grown. (Fig. 83.)

Raby Castle.—Below medium, turbinate, about 1½ inches wide by 1½ inches long. No neck and short stalk. Flattened at apex. Many shallow ribs. Tree moderate grower with rounded head. Leaves deeply 3-lobed. This fig resembles greatly the Pacific White and may be identical with that fig. Name doubtful.

Ragusa—*Dalmatian*; *Dalmatian Ragusaine*; *Ragusaine*.—A white fig of fair quality, introduced from Dalmatia to France. Probably the same fig as introduced by G. N. Milco to California under the name *Dalmatian*.

Ragusaine—*RAGUSA*.

Recousse Noire—*Ecoussé Noire?*—Large, roundish-oblata, with long neck, and with lopsided swollen cheek on one side. Ribs obscure; stalk very short; eye closed; skin violet-dark mahogany or chestnut, pale toward the neck and greenish toward the stalk end; pulp opaline with a shade of rose in center. Tender and juicy, but not flavored. Medium quality (Hogg). A very good late fig.

Recousse Violette.—Similar to *Recousse Noire*, but with deep red pulp.

Reculver.—Is said to be different from *Grosse Violette de Bordeaux*, *SAN PEDRO*, BLACK, from which it differs by being smaller and more round. It also resembles *Black Provence*.—*MARSEILLAISE*, BLACK. It was originally found growing wild on an old wall in the village of Reculver, in Kent, England. Fruit small, roundish; skin black; pulp red, thick, but not rich (Barron).

Reculver.—Medium; about $2\frac{1}{4}$ inches long by $1\frac{1}{4}$ inches wide; pyriform, tapering; lopsided cheeks; short narrow neck; no stalk. Low, branching ribs, distinct from stalk to the eye. Eyes small, closed or open, with small, rosy-colored scales. Skin slightly hairy, of a brownish violet, covered with a faint gray bloom. Pulp thick, amber-salmon, lightest at eye, turning salmon towards the stalk end. A good fig. Leaves about 9 inches by 3, deep, broad lobes and two shallow spurs. Not identical with *Black Marseillaise*, as suggested by Dr. Hogg. There are two distinct figs known as *Reculver*. The author has not seen the variety mentioned by Barron.

Reculver?—*MARSEILLAISE*, BLACK.

Red—*BRUNSWICK*.

Red-Black—*ROSE NOIRE*.

Red Caliana.—*CALIANA*.

Red Frette—*ROUGE DE LA FRETTE*.

Rocardi.—Small; about $1\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide; pyriform, with small neck; stalk very short. Eye small, sunk; scales large, with rough iris. Skin smooth, with indistinct ribs. Color of skin violet-purple, with fine, gray bloom extending all over the fig, or with dark violet flush. Pulp sweet, amber or reddish amber, with different shades. Meat thin, white. Pulp solid. Tree a moderate grower. Leaves 3-lobed.

Rock Fig—*NEGRETTE*.

Rolandina—*Briasca* (*Grasse*); *Rolandine*; *Blanchette*; *Fico Dattero*; *Ficus vazzoso*; *Cortese* (eastern Riviera); *Coasco* (western Riviera); *Ficus rolandina* Risso; *Ficus sylvestris* var. *praedulcis* Geny.—

One crop. Size medium; $2\frac{1}{4}$ inches long by $1\frac{1}{4}$ inches wide; short, pyriform or bell-shaped; skin yellowish green mixed with red and violet. Eye reddish; pulp yellowish white, tinted rose, very sweet and thick, with small seed, highly flavored. Tree medium, with deeply-cut and pointed lobes. Together with *Bellona*, the *Rolandina* is one of the very best figs cultivated in the south of France for drying. It is extensively grown there and the object of much trade. Fresh it is of medium quality only. Principally grown in the south of Provence.

Rolandina Negra—*Rolandine Noire*; *Ficus rosa nigra* Risso; *Ficus sylvestris* var. *rubricaulis* Geny.—A variety of the reddish-gray *Rolandina*, more oblong turbinate, dark violet reddish, with red pulp. Provence, France.

Rolandine—*ROLANDINA*.

Rolandine Noire—*ROLANDINA NEGRA*.

Rondella Blanca—*White Rondella*; *Ficus helena* Risso.—Similar to the *Black Rondella*, but with thinner skin and of a yellowish green color. Mentone-on-the-Riviera, France.

Rondella Negra—*Black Rondella*; *Ficus sylvestris* var. *ceresana* Geny (*San-vaigo*).—Below medium; $1\frac{1}{2}$ to 2 inches diameter; turbinate; suddenly contracted at the neck, which is long; eye red, with violet iris; skin blackish violet; pulp red. Around Mentone-on-the-Riviera.

Bondeletta—*Ficus carica* var. *rotundula* Geny, S.—Globular; bright green shaded brown; $1\frac{1}{2}$ to $1\frac{3}{4}$ inches diameter. Pulp red. Savoy at Nice.

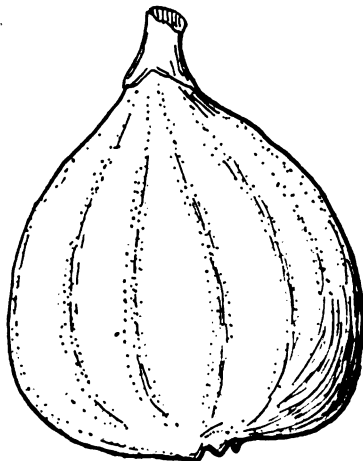


FIG. 83.—Baby Castle fig.

Bonde Noire—Round Black.—Size large, about $2\frac{1}{2}$ by 2 inches; quite round, irregular; neck distinct but very short, well set; ribs distinct, running together and hardly elevated; eye small; scales very small, reddish; iris large, paler, not elevated, but still distinct, with a margin around the scales. Skin smooth, waxy, color dark violet-brown, very evenly diffused, and in the shade hardly paler, only near the stalk more greenish. Bloom thick, bluish white; pulp amber, meat amber. A very fine fig, which can not be too highly recommended as a table fig. Entirely distinct from Osborn Prolific. (Figs. 84, 85.)



FIG. 84.—Bonde Noire figs.

Bonde Rouge.—Medium; color of skin dull, tawny red; pulp dull red. Second crop of good quality. (Barron.)

Bonde Violette Hâtive.—First crop: Large, $2\frac{1}{2}$ inches long by $2\frac{1}{2}$ wide; almost globular, with no neck and no stalk; ribs large and prominent; skin smooth,

glossy; color green, the ribs shaded violet brown, numerous very small white specks all over the skin: eye large, but not protruding, wide open with small scales of an amber-rosy color; pulp amber, shaded rose in center; meat whitish. A magnificent looking breba of first quality. Brebas ripe at Niles August 1.

Rose Blanche—*White Rose; La Rousse*.—Very large, round, depressed or flattened at the apex. Stalk long; color brownish on white ground; pulp lively red; leaves crenate, 7-lobed, with pointed lobes. Requires dry soils. South of France.

Rose Noire—*Red-Black; Cou de Muelo*.—Size medium, pyriform, contracted at the middle; skin reddish violet; pulp white amber; leaves crenate, 7-lobed, with pointed lobes. Requires dry soils. One of the better figs in Provence. Hogg erroneously gives as synonym Black Ischia, which is a much smaller fig. (Fig. 86.)

Rose Peyronne.—Medium; roundish oval; obscure ribs; stalk one-fourth inch long; skin pale brown with fine gray bloom; pulp pale salmon of good quality.

Rose White—*ROSE BLANCHE*.

Rosine.—Said to be a white, round fig from Syria. Good for drying.

Rosso di Mensiglia.—Italy.

Rotondo Levigato.—Italy.

Round, White Smyrna. (See Smyrna figs, p. 279.)

Rouge de la Frette—*Frette; Red Frette*.—Large; oblong; pyriform; skin red. Late. Grown around Frette, near Paris, France.

Rougette.—Small; obovate; without ribs; stalk short; eye closed; skin red, coppery yellow in shade, shading to yellow toward stalk end. Pulp coppery red, of indifferent quality. (Hogg.)

Round Black—*RONDE NOIRE*.

Round Verdal—*VERDAL, ROUND*.

Round White—*BLANCHE RONDE*.

Roussana—*Ficus sylvestris* var. *rubella* Geny.—Second crop; medium, 1½ to 2 inches diameter; color pale reddish-violet with red pulp. Nice and its vicinity.

Royal—*VERSAILLES*.

Royal de Versailles—*VERSAILLES*.

Royal Vineyard.—Fruit above medium or medium long; pyriform, with long slender neck and long slender stalk; ribs mere longitudinal lines. Eye large, open; skin thin, hairy, reddish brown or purple, with thick blue bloom; pulp bright reddish, hollow in center, but otherwise juicy and good and highly flavored. The true name was not known when the variety was introduced into England. (Fig. 87.)

Rubado—*Cuore; Rubaldo; Figa Rubado* (Genoa); *Arbauda; Roubauda Blanca* (Nice); *Ficus richardi* Bisso; *Ficus carica* var. *robusta* Geny.—Above

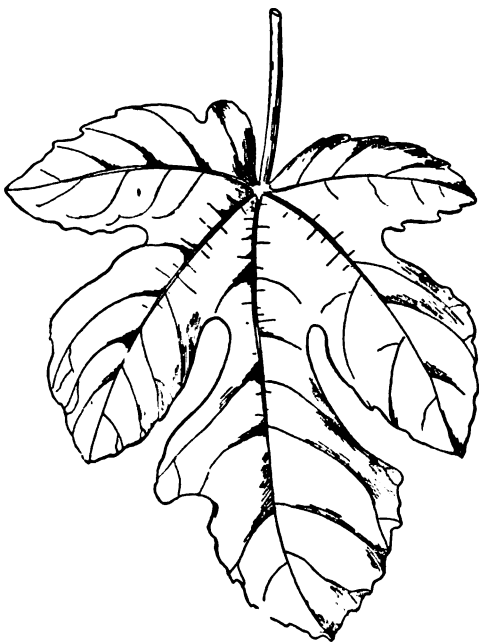


FIG. 85.—Leaf of *Ronde Noire* fig.

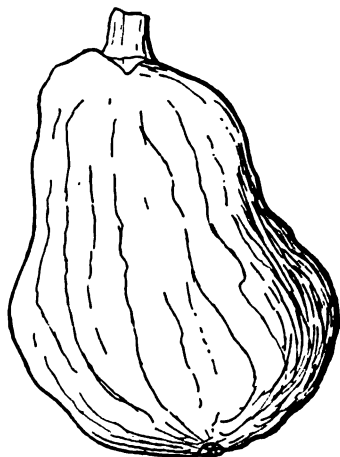


FIG. 86.—*Rose Noire* fig.

medium, about $2\frac{1}{2}$ by $1\frac{1}{2}$ inches, bell-shaped to turbinate or heart-shaped; greatest diameter at center, gradually tapering toward the stalk, which is of medium size. Skin thick, smooth, of green color, shaded reddish brown and yellow in the sun, and with ashy gray in the shade, adhering strongly to the meat. Pulp intensely red, very sweet and flavored, with a drop of honey exuding at the eye, rather sharp in taste; eye reddish; leaves small, 3-lobed, and not deeply cut; branches few and slender and tree of small growth to medium. The first crop very small or none. The second crop larger; ripe in September and November. One of the best Italian figs for the table. Extensively cultivated in northern Italy and Provence, but especially so in the Marche, Umbria, Sabina, Piedmont, Appenines, Lombardy, and Romagna. In many places known as *Fico Cuore*, on account of its heart-like shape. Is to be highly recommended. (Fig. 88.)

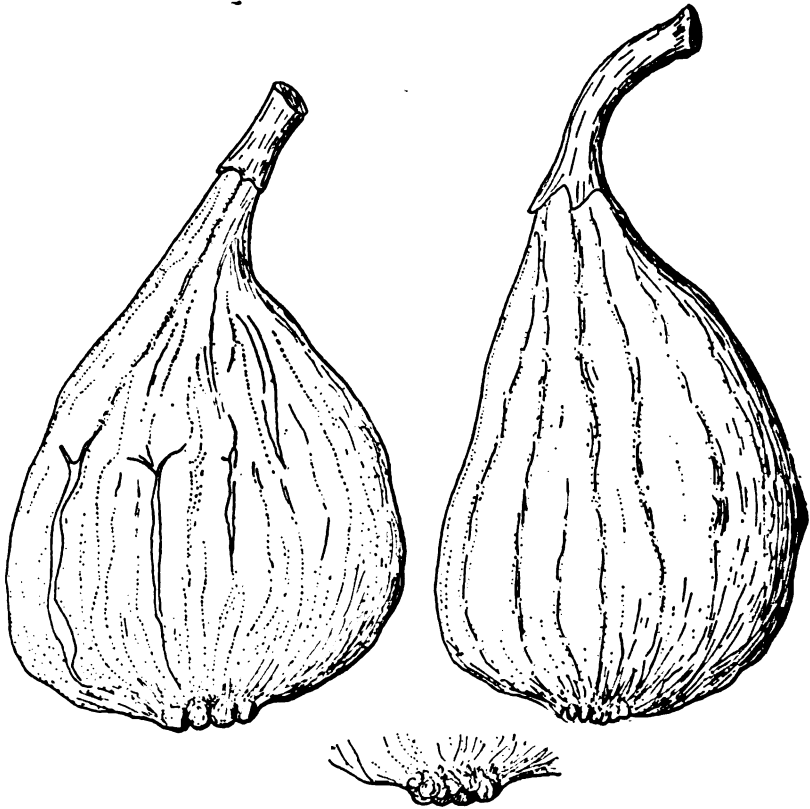


FIG. 87.—Royal Vineyard figs.

Rubado Negro—*Ficus serotina* Risso; *Ficus sylvestris* var. *hyberna* Geny; *Roubauda Negra* (Nice).—Size 2 to $2\frac{1}{2}$ inches diameter; turbinate; violet red or fine black; eye red with a large reddish-brown iris; skin hard; pulp bright red, thick, agreeable. November. One of the latest figs. Nice, Italy, etc.

Roubauda Blanca—RUBADO.

Roubauda Negra—RUBADO NEGRO.

Rubaldo—RUBADO.

Rubicone—SAN PEDRO, BLACK.

Safranée.—Reddish gray. Nice and Salon, France.

Saint Dominique—DOMINIQUE.

Saint Esprit.—Large, oblong; color dark violet. Resembles Aubique Noire but is inferior in taste. Provence and near Ponte St. Esprit in Languedoc, as well as at Aix and Salon. A good early crop; second crop poor.

Saint Francis—FRANCISCANA.

Saint Jean—De Saint Jean.—Very large; two crops. France.

Saint John.—First crop; above medium, $2\frac{1}{2}$ inches long by 2 inches wide; pyriform; stalk medium, longer than the neck, which is not well set; skin smooth, waxy; ribs few, irregular; skin yellowish green, with numerous light specks of unequal size; eye small, closed, with warty iris of the same color as the fig; scales about six, large, pale dingy white; pulp and flesh white with small seed. Leaves medium, 5-lobed; end lobe the largest; lobes rounded, deeply cut; stalks long. A very sweet and juicy breba, ripe at Niles August 1.

Saint Johns.—Possibly the same as Saint Jean.

Saint Peter—SAN PEDRO, WHITE.

Saint Ursula d'Avignon.—Below medium; oblong, without neck; stalk short; eye open; ribs very obscure; skin pale brown or copper, paler on the stalk, where it is tinged green; pulp tender, pale rose in center, opaline toward the meat and skin. A small but very delicious fig. (Hogg.)

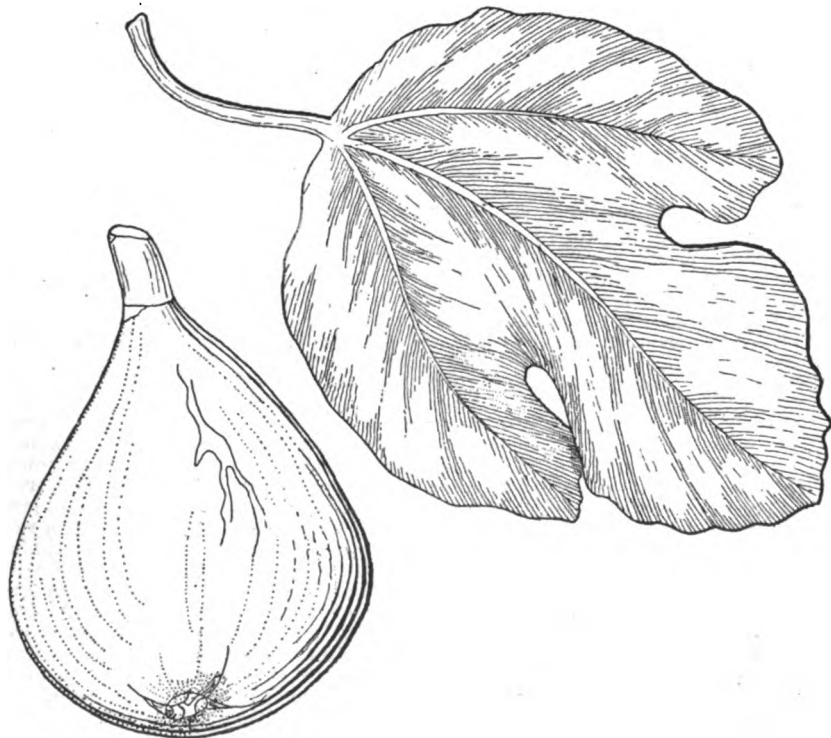


FIG. 88.—Rubado fig.

Salada—Ficus purpureo-violacea Risso (S).—Two crops; second crop pyriform: $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide, quickly contracted at the neck; color purple violet or pale purple; pulp reddish brown. Nice and the Riviera.

Salerne.—Above medium to large; $2\frac{1}{2}$ inches diameter; globular; stalk and neck short; eye very open; skin whitish yellow. A hardy fig, not subject to dropping or injury by rain. A very early variety, requiring dry and high ground. Provence.

Salette—Provence.

San Francé—FRANCISCANA.

San Pedro—SAN PEDRO, WHITE.

San Pedro, Black—Aubique; Black San Pedro; Corbo (Pescia); Piombinese (Pisa and Collina); Rubicone (Carrara and Sarzana); Arbicone (Genoa); Fico Nero (Sardagna); Pittilonga; Minna (Sicily); Minna di Schiavo; Fallagiana (Abruzzo); Aubique Noire (Provence); Breba Negra (Spain); Aubique Violette (Provence); Violette Longue? (France); Aubiquon (Provence); Auliquo; Grosse Violette Longue; Figue Poire; Fico Arbicone (Genoa); Fico San Piero (Tos-

cana); *Fico violacea* Risso; *Ficus erin. var. uberrima* Geny; *Negro Largo*; *Noire de Languedoc*; *Grosse Rouge de Bordeaux*; *Grosse Violette de Bordeaux*; *Nero Oblungo*.—Dr. Hogg, in his catalogue, confounds this fig with *VIOLETTE DE BORDEAUX* and *Petite Aubique*, BORDEAUX, which are different figs of smaller size and of pale-grayish color, for description of which see "Bordeaux." On the other hand, the author is satisfied that Dr. Hogg's *Negro Largo* and *Noire de Languedoc* are identical with the *Black San Pedro*, although this is not quite clear from his description of the variety.

Two crops. First crop very large, from $3\frac{1}{2}$ by 2 inches or 4 by 2 inches. Shape elongated, ovate; no ribs; with prominent and well-set neck. No, or very short, stalk, flattened laterally and rather lopsided, one side of apex hanging down more than the other. Eye open, reddish; skin smooth, violet black, with a rosy flush in the shade and green on the neck; fine blue bloom; pulp coppery red, tinted with violet; very sweet, but with a light disagreeable smell and bitterness. Second crop smaller, oblong, $2\frac{1}{2}$ by $1\frac{1}{2}$ inches; ribs many and prominent; color deep sea green, with violet-black ribs; eye medium, with many spreading yellow scales; pulp reddish violet, rather coarse; meat thick, greenish white. Tree very strong grower, requires moist and rich soil. Leaves large, 3-lobed, forming a very dense foliage. The first crop is a table fig of unsurpassed size and fair quality. The second crop dries well, but is small in quantity and inferior in quality compared to the first crop.

The *Black San Pedro* is one of the most excellent of the black figs. It is cultivated extensively in northern Italy, Provence, and Spain. It thrives also in the vicinity of Paris. The author has seen figs of large size and fair quality near Santa Ana, Cal. In size it is probably unsurpassed by any other black fig known. Though the fig is called *San Pedro, Black*, it must not be understood that it is a variety of the *San Pedro, White*, or vice versa. The two figs do not resemble each other in the least, and are, in fact, not related, and the only thing they have in common is the name. Under the name of *Grosse Violette de Bordeaux* the author received from Rev. Dr. Wilks a fig distinct from either *Bordeaux* or *San Pedro, Black*. It resembles somewhat *Negrone*, but has smaller leaves. (See *Violette de Bordeaux*.) (Fig. 89.)

San Pedro, White—*Fico di San Piero*; *Fico di San Pietro*; *Apple Fig*; *Breba* (erroneously); *Saint Peter*; *White Saint Peter*; *Fico di Saint Pierre*; *San Pedro*.—Two crops, the first only maturing without caprification. Large, rounded; 3 to 4 inches diameter, somewhat flattened at apex; stalk and neck very short; eye large, open, but not protruding. Skin ribbed, not waxy, thick, but tender, of a bright yellow color in sun, shading to greener in shade, with no bloom, but showing off like a lemon on the tree. Color of scales yellow, with violet iris; pulp light amber, opaline, with here and there a trace of red; rather coarse but sweet, and somewhat deficient in flavor. A remarkably handsome fig, but difficult to ship any distance. Large growing tree, with upright branches; leaves waxy and not deeply lobed, with obtuse points. Requires deep, rich, moist, but not wet, river-bottom soil. Only the first crop comes to maturity without caprification. Is not related to *Black San Pedro*.

Second crop: Fig as large or larger than the first crop; about $2\frac{1}{2}$ inches wide by 2 inches long, being decidedly flattened, like an onion. The eye is large and wide open, with amber scales of small size, of a spreading nature. No stalk and no neck. Many ribs from eye to stalk distinct all around. Color of skin deep sea green, without any flush of yellow in the sun. Flesh, deep and bright strawberry red, without any violet tint. Meat, yellowish white. Seed, many, but very small. Pulp, fine, juicy, and highly flavored and distinctly acid. A most exquisite fig and much superior to the first crop, which often is insipid. This crop was produced at Niles on a properly caprificated *San Pedro* fig tree standing next to a capri Milco. It bears a full second crop, while all other *San Pedros*, which had not been caprificated, dropped all their second crop, just as they had done for ten or more years past. It is interesting to note that the second crop differs from the first crop in shape and quality. Caprificated, I consider *San Pedro, White* as one of the most delicious figs I have seen. It may possibly prove to be a valuable fig not only for the market but also for drying.

San Pedro, White, is rather extensively distributed in California, especially in San Joaquin Valley. When well grown it is a very good fig, which, when near a market, sells well. It was introduced to California at various times, once under the name of *Breba*, from Spain.

Sang de Lièvre—*Rabbit Blood*.—Large, rounded; skin bright brown; pulp blood red. Good bearer and fair quality for table.

Saracène—SARAINA.

Saraina—*Saraina*, *Saracène*; *Ficus saracénica* Risso: *Ficus erin.* var. *erodens* Geny.—Medium, about 2 to 2½ inches diameter; oblong turbinate; skin thick and hard, cracking, bitter, adhering to the pulp, which is red. Color of skin blackish violet: stalk of the fig easily detached from the branch upon which it grows. Nice and Provence.

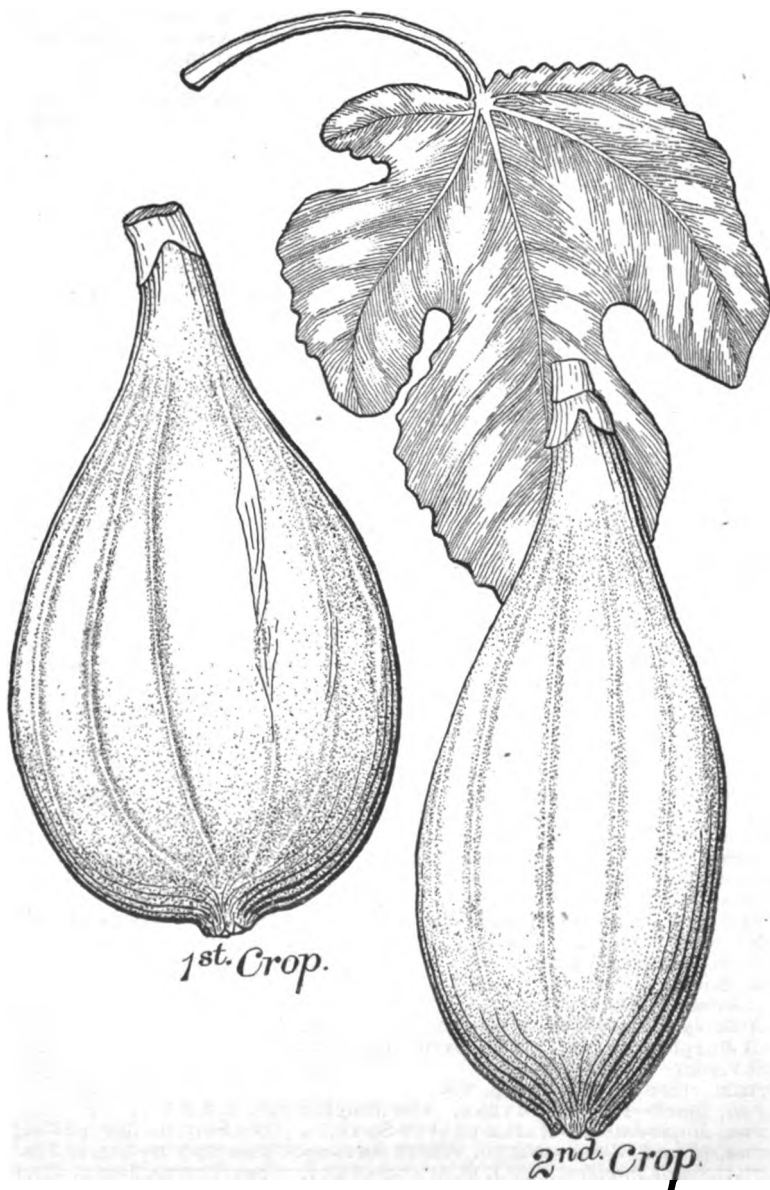


FIG. 89.—San Pedro, Black figs.

Saraina—**SARAINA.**

Sareigne—*Verdale*; *Pichotte-Barnissoto*.—About 2 inches diameter; round, neck very short, strongly adhering to the branch and not separating even when ripe. Skin thick, of a very dark, violet black, greenish at the neck.

Pulp red. Good, but requires great heat and moist and rich soils. Leaves 3-lobed, undulating margins with obtuse lobes. Common in Provence. Recommended for the warm valleys of California and Arizona.

Sarnese.—France.

Servantine.—SERVANTINE, CORDELLIÈRE.

Seirola.—*Seyrole*; *Seirolles*. Duhamel?: *Ficus seirola* Risso; *Ficus carica* var. *leiocarpa*, Geny.—Medium or small; second crop turbinate; 1½ to 2 inches; skin greenish-yellow; eye prominent, green; pulp yellow, very sweet, dries well. Savoy and Provence around Nice, Grasse, and Draguignan.

Seirolles.—SEIROLA.

Servantine.—*Servantine*; *Observantine*; *Cordellière*; *Savantine*.—First crop, large, round, with prominent ribs; second crop, half size. Color pale yellow; pulp red. A good fig, which requires moist, rich soil. (Fig. 90.)

Servantine d'Argenteuil.—A variety of *Servantine*, with greenish red skin. Very large, round. Fertile and early. Grown around Argenteuil.

Servantine Grise.—*Gray Servantine*.—A variety of the *Servantine*, but not identical with the *Servantine Bifère*.

Servantine Bifère.—*Grise Servantine Bifère*; *Toulousienne*.—Probably the same as *Toulousienne*, but not the same as *Servantine*. Below medium, short, pyriform; skin dull brown, ribbed, with a thick, gray bloom; flesh dull red, thick, sirupy, and luscious.

Servantine Rouge.—A variety of the preceding with red skin. Large, round. Said to be fertile and good.

Servantine.—SERVANTINE.

Setosa.—PELOUA.

Sextius.—A white fig of good quality from Aix, France.

Seyrole.—SEIROLA.

Seyroles.—For drying. At Grasse and Draguignan.

Siciliana.—*Figa Siciliana* (Nice); *Ficus siciliana* Risso; *Ficus sylvestris* var. *bruttia* Geny.—First crop above medium; 3½ inches long by 2½ wide; oblong, rounded at apex; color greenish-yellow, with grayish spots. Eye very large, raised, reddish; meat violet; pulp yellowish and pale red. Nice and vicinity.

Singleton.—ISCHIA, WHITE.

Small Black.

Small Brown.—MALTA.

Small Early White.—EARLY WHITE.

Small Purple Smyrna. (See *Smyrna* figs, p. 279.)

Small Verdal.—VERDAL, ROUND.

Smyrna. (See *Smyrna* figs, p. 279.)

Smyrna, Black.—PURPLE SMYRNA. (See *Smyrna* figs, p. 279.)

Smyrna, Maple-leaved.—MAPLE-LEAVED SMYRNA. (See *Smyrna* figs, p. 279.)

Smyrna, Round White.—ROUND, WHITE SMYRNA. (See *Smyrna* figs, p. 279.)

Smyrna, Small Purple.—SMALL PURPLE SMYRNA. (See *Smyrna* figs, p. 279.)

Strawberry Fig.—ADRIATIC.

Striped.—PANACHÉE.

Striped Signora.—COL DI SIGNORA PANACHÉE.

Sucrada.—*La Suocrada*; *Sugar Fig*. *Ficus saccharata* Risso; *Ficus carica* var. *formosa* Geny.—Two crops. First crop, pyriform; greenish-yellow, flushed brown on the ribs. Second crop, turbinate; 2 to 2½ inches; rounded, ribbed; color greenish, bright yellow toward apex; pulp, pale red, very sweet. A very distinct fig.

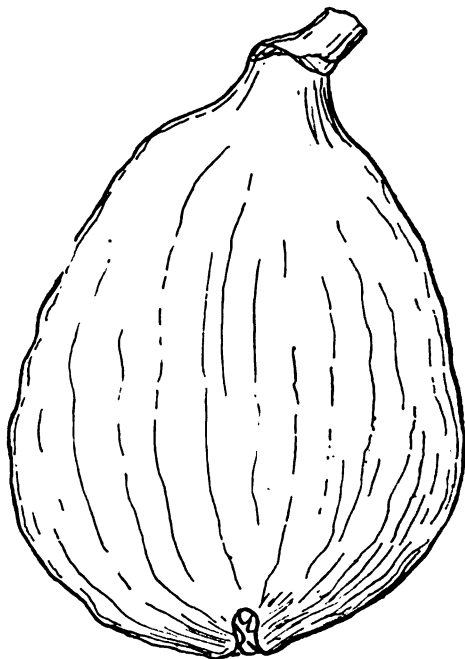


FIG. 90.—Servantine fig.

Sugar Fig—SUCRADA.**Sulane.**—Oblong, white. France.**Sweet Briasca—BRIASCA DOUSSA.****Sweet Brayasque—BRIASCA DOUSSA.****Tapa Cantin—TAPA CARTIN.**

Tapa Cartin—Aubico Blanco; Aubique Blanche; Gross: Jaune; Tapa Cantin; Bouche Barrique; Ficus monstrosa Risso; *Ficus carica* var. *prolifera* Geny.—A very large fig, and one of the largest white figs known. Size, 3 to 4 inches long by 2 and 2½ inches wide. Shape oblong, often contracted at the middle, and rather irregular as to outline: neck thin, long; skin very thin, yellow; eye large, open; pulp bright blood red, with numerous seeds. This fig frequently develops a monstrosity—another receptacle cropping out of the apex of the first one, just as a rose is often found protruding from the center of another rose. Leaves, 5-lobed, with undulating margins and obtuse lobes. Requires moist soils. Cultivated around Nice, Provence, France, and in other places. (See also Merioun.)

Tapa Cartin Negre.—A black variety of the preceding, with lustrous black skin.**Thameriouth.**—A white fig from Kabylia.**Thabellout.**—A white fig from Kabylia.**Thaberkant.**—A black fig from Kabylia.**Thabouhiaboult.**—A black fig from Kabylia which dries with difficulty.**Thabouhiaboult.**—A white fig from Kabylia. Is dried and cured with some difficulty.**Thadhefouith.**—A white fig from Kabylia. Does not require caprification.**Thadoukkarth-en-thara'animt.**—A variety of caprifig from Kabylia.**Thadoukkarth-en-tifouzal.**—A variety of caprifig from Kabylia. The best variety.**Thadoukkart-en-t'it-en-tesekkourth.**—A variety of caprifig from Kabylia. The name means "pheasant's eye."**Thadoukkart guir'zer.**—A wild caprifig from Kabylia. It is not used for caprification, but only as stock for grafting. The word means "the caprifig of the river bottoms."**Thadoukkarth Thaberkant.**—A variety of caprifig from Kabylia. Color black.**Thakournennaith.**—A white fig from Kabylia, the name meaning "round."**Thamellalt.**—A white fig from Kabylia.**Thaoussifith.**—A white fig from Kabylia.**Thar'elit.**—A white fig from Kabylia.**Thar'animt.**—The most esteemed white fig grown in Kabylia. Requires caprification in order to produce mature fruits.**Thazerart.**—A white fig from Kabylia. Does not require caprification.**Thazaicht.**—A black fig from Kabylia which requires caprification.**Tibourenque.**—Fresh and dry; middle of September. Marseilles and Salon.**Tiburtina.**—GENTILE.

Toscana—La Toscana; Florentina; Figa Florentina; Ficus carica var. *florentina* Geny.—Two crops. First crop pyriform, lopsided, of large size, 3½ inches long by 2 wide. Eye prominent; skin rough, dotted, of greenish-yellow, shaded gray; pulp pale yellow, streaked violet, sweet, highly flavored. Better than the Gentile. A variety of this fig with brown skin is found near Bordighera, Nice, and Provence.

Toulousienne.—Medium; about 1½ inches wide by 2 inches long; pyriform, with flattened apex. Neck distinct. Stalk small, almost none. Ribs many, shallow, and almost imperceptible. Color of skin dingy olive-green with violet-brown flush. Pulp bright strawberry red. Meat greenish-white. Eye small, with rough iris of the same color as skin. Tree medium. Leaves small, shallow, 3-lobed, almost entire, and of rounded outline. Quality of fig good, but appearance is insignificant.

Toulousienne—SERVANTINE BIFÈRE.**Tres Fer—TRIFERO.****Tre Volte—NATALINO.****Trifère—TRIFERO.**

Trifero—Tres Fer; Précoce d'Espagne; Trifère; A Tres recoltef.—Three crops. Small, rounded turbinate or pyriform, about 1½ to 2 inches long by 1½ inches wide, with obscure ribs: stalk about one fourth to three-fourths inch long; no neck. Color dark green, transparent, shaded brown around the crown, paler toward the stalk; eye small, closed; pulp opaline nearest the meat, rosy toward the center. Fig is well filled. A very small, early and constantly bearing fig, rich, juicy, and of very good quality, recommended where only one tree can be grown. Leaves very small, about 5½ inches, with 3 large lobes and 2 small spurs.

Trille—*Madame Trille*.—Large, white skin. Two crops. Originated in France, or at least named there.

Trois Récoltes.—Small, ovate, skin dark, tawny copper colored; pulp dull red, with but little flavor. Early and free bearer. (Barron.)

Trojano.—A green Italian fig from the vicinity of Naples. The best table fig grown there. Has not yet matured in California.

Trompe-Chasseur—CUERS.

Trompe-Cassaire—CUERS.—Probably the same as NATALINO.

Truett.—Below medium, about 1½ inches by seven-eighths inch; shape elongated oval.

Tulpick.—Said to be a Syrian drying fig of superior quality.

Turca—PRINCESSA.

Turkey, Brown—BROWN TURKEY.

Turqui—LEVANT.

Twin Fig—MERLINGA.

Walton—BROWN TURKEY.

Varina—Italy.

Vepra.—Size medium to small, rounded turbinate, no neck and short stalk, many indistinct ribs. Eye small and closed, skin waxy, transparent, of a fine greenish-yellow color. Pulp almost pure white, faintly ambered, with small seed. A fine, juicy, refreshing fig, but not highly flavored. Tree moderate, upright. Leaves small, 3-lobed, about 4½ inches in diameter, rough, with shallow lobes. The stalk of the leaf is unusually long, sometimes twice as long as the leaf.

Velue—PELOUA.

Velvet Fig—PELOUA.

Vendome—ANGÉLIQUE JAUNE.—Local name given by Messrs. Strong & Co. (California). This fig is undoubtedly the same as ANGÉLIQUE JAUNE.

Verdal—VERDAL, LONG.

Verdala—VERDAL, LONG.

Verdala Blanca—VERDAL, WHITE.

Verdal de Valence.—Below medium, roundish, turbinate, slightly ribbed, skin dull tawny red, with a fine bloom; flesh thick, dull red. Second quality, very prolific. (Barron.) Name doubtful.

Verdal, Long—*Verdala* (Nice); *Verdale* (Provence) *Ficus virescens* Risso; *Ficus carica* var. *multifera* Geny; *Gironetta*; *Grosse Verdale*; *Verdal Longue*; *Long Verdal*; *Verdal*.—One crop, September. Size medium, about 2½ by 1½ inches, shape oblong-turbinate; stalk and neck short, woody and hard. Eye large, closed, bright red, skin thick, with ribs of a yellowish-green color, with the ribs flushed brown, base of fig violet, no bloom. Pulp pale strawberry red, of fair or good quality. A very large spreading tree with deeply lobed leaves. Common in south of France, and also growing in a few localities in California, where it, however, has not been thoroughly tried.

Verdal Longue—VERDAL, LONG.

Verdal Ronde—VERDAL, ROUND.

Verdal, Round—*Petite Verdale*; *Verdal Ronde*; *Round Verdal*; *Small Verdal*.—One of the earliest of figs, ripe in June and July. Below medium or medium, about 1½ by 1½ inches or larger; shape round, or slightly pyriform, without stalk or neck and with low and distinct ribs. Skin smooth and waxy, of a uniform bluish-green at the apex, gradually lighter toward the stalk end. No bloom; eye closed, small, but large in proportion to the size of the fig, with few but comparatively large scales of amber color at the point, darker rose at the base. Pulp dark blood red, very fine, sweet and highly flavored in some localities. A small but fine variety. This fig is highly praised in Santa Clara Valley, California, and around Nevada City, Cal., but is inferior in the San Joaquin Valley, California. Extensively distributed in the south of France, where it loves dry and mountainous regions. This variety is very useful for conserves and preserves, as the fig is small, very sweet, and the skin is waxy—all points favorable for the preparation of a good article of conserve and glacé fruit. (Fig. 91.)

Verdal, White—*Verdala Blanca*; *Ficus variabilis* Risso; *White Verdal*.—Almost pyriform, with a long neck, color green, changing to whitish. Size small, about 1½ inches diameter; pulp blood red, very sweet. A variety of Verdal mentioned by Risso as grown in Provence, France.

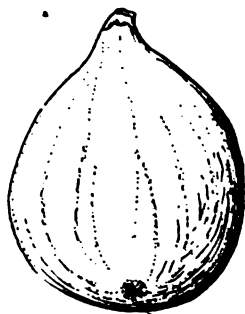


FIG. 91.—Verdal, Round fig.

Verdale—SAREIGNE.

Verdale—VERDAL, LONG.

Verdaou—GROSSE BEURDOUA.

Verdara—CIMEIPENCA.

Verdecchij—VERDECCIO.

Verdeccio—*Verdechio* (Tanara); *Verdecchij* (Aldron); *Verdichio* (Bologna); *Verdolino* (Piacentino).—Below medium, about 1½ by 1½ inches: shape round, swollen, uneven, depressed at apex, with no neck; stalk short; eye small, red; ribs distinct and regular; skin tender, bright green, turning yellow in sun; pulp amber white, very sweet and very fine. (Fig. 92.)

Verdeccio di Brianza—VERDINO DI BRIANZA.

Verdechio—VERDECCIO.

Verdichio—VERDECCIO.

Verdino di Brianza—*Verdeccio di Brianza*.—A green fig of good quality; Italy.

Verdolino—VERDECCIO.

Verdone.—Medium, or above medium; round; skin green; pulp red. The famous fig grown in the vicinity of Rome, claimed by W. B. West to be identical with the Adriatic, which, however, is by no means certain. As far as I know there are no trees of Mr. West's importation now alive in California.

Verdone (Rome)—ADRIATIC.

Vernissenque—*Bernissenque*.—Large, turbinate, regular; neck long; stalk short; longitudinal ribs, most distinct on the neck; eye open; skin perfectly deep black, without trace of lighter color, with a fine bloom like that of a dark plum. Pulp dark blood red, sweet, but flat. A very showy, second-rate fig with small seeds, flavored and of good quality. Leaves, 5-lobed, much serrated and crumpled, longer than broad. Only second crop; matures late in September. This fig is not identical with either *Verdone* of Verona and Rome, *Verdini* of Milan, *Verdolino* of Piacentino, but resembles greatly *Zigerino Verde* (Enganei) (G). Cultivated in Lombardy in the district of the Po. Neris is identical with any of the Verdals, but seems to be a distinct and well-characterized fig, superior in flavor to the small round Verdal, which it somewhat resembles. The Verdal is a handsomer but not as fine a fig.

Versailles—*Abondance*; *Royal*; *Royal de Versailles*.—Two crops; first crop medium, about 2½ inches wide by 2½ long. Longer than broad, bell-shaped, flattened at apex, with a distinct neck; stalk medium; ribs few, well marked; color pale greenish white; pulp rose. Second crop: small with longer stalk; leaves 5-lobed, undulating with obtuse lobes. Similar to *Blanche Commune*, but is longer and with a more contracted neck. A coarse and poor fig when grown in English hothouses or when in an unsuitable climate. Highly recommended by French growers as one of the best figs for the table, at least in certain districts. Mr. Felix Gillet, of Nevada City, Cal., who has grown this fig extensively, writes that the skin peels off like that of an orange and that it is a very sweet fig, which stands shipment well, the first crop ripening with him about July 1, and the second crop in September. (Fig. 93.)

Verte—CUERS.

Verte Brune—*Ficus carica* var. *deceptans* Geny; *Hunter's Deception*.—Two crops; second crop, medium or small, 1½ to 2 inches diameter; globular, compressed at the stalk and with unequal cheeks; skin cracking, bright or blackish-green, with a violet flush in the sun. Eye, reddish; pulp, blood-red, of good or fine quality. Leaves 5-lobed, crenate, with pointed lobes. Savoy and Provence, around Grasse and Toulon. There is another fig with this name. (See Cuers.) The name of the fig is derived from the fact that the fig appears unripe while in reality it is perfectly ripe.

Verte Brune—CUERS.

Verte Brune—PEAU DURE.

Verte Petite—LIPARI.

Vigasotte Bianco.—Size small, about 1½ inches round, turbinate. No neck; stalk one-half to three-fourths inch; skin rough, uneven; coarse but shallow ribs; eye small, closed; pulp white, faintly amber; seeds small, but numerous; color pale green, without fine bloom. Leaves medium to small, about 6 inches, rough, coarse, especially underneath; margins wavy.

Vigasotte Bianco—*Vigasotte*.—Small, roundish, turbinate, 1½ inches wide by 1½ long; neck very short or none; stalk medium or none; ribs indistinct; eye very small, closed or open, scales small amber; skin smooth, cracking, very thin, transparent, with very thin bloom; pulp amber, with few seeds; meat white. A juicy and good little fig, but it is not highly flavored. Tree a moderate grower. Leaves small, with long stalks, 3 to 5 lobed, the two upper lobes being very small. Under this name there are two distinct figs sent out.

Vigasotte—VIGASOTTE BIANCO.

Violette de Bordeaux.—Small, 2 inches long by $1\frac{1}{4}$ inch, pyriform, tapering; no distinct neck, but with long stalk, which is bent over. A few shallow ribs,



FIG. 92.—Verdecchio figs.

especially distinct on neck above cheeks; eye very small, closed; scales yellow; skin rugose, slightly downy, of a violet-black color, with a distinct and fine

blue bloom, confined to the neck, ending sharply halfway to the equatorial. Pulp fine, dense, brownish salmon; meat violet-white, not rich; leaves from 5 to 7 inches long, 3 deep, narrow lobes outside of spurs. Very similar to Negrone, but has smaller leaves.

Violette de la Frette—*De la Frette*; *Figuier Rouge*.—Medium, oblong, somewhat flattened; skin reddish brown, with violet flesh; color of pulp rose. Grown at Frette for the Paris market.

Violette Longue—SAN PEDRO, BLACK.

Violette Perruquier—PERRUQUIER.

Violette Sepor.

Walton—BROWN TURKEY.

Warren's Brown Turkey—WARREN.

Warren—*Warren's Brown Turkey*.—First crop; very large, turbinate, about 5 inches long by 2½ inches wide. Neck long, tapering; stalk very short; ribs narrow, numerous, and shallow. Eye large, with many prominent and expanding scales of a brownish yellow color. Pulp coarse but sweet and juicy, solid; meat narrow and thin. Color of skin greenish on neck, violet at apex and along the sides. Color of pulp and meat rosy amber, with violet streaks and spots. One of the best brebas known in California. Leaves large, with three shallow lobes.

This fig is different from the true Brown Turkey and quite distinct from the Brunswick, which it also resembles. In fact it resembles more the Brunswick than the former. The true name of this fig is not known. Introduced or at least distributed by Colonel Warren in the early days of fruit culture in California. Possibly identical with San Pedro, Black. Tree a strong grower and heavy bearer. Grown in Vacaville, Cal., under the name of Brown Turkey.

White Adriatic—ADRIATIC.

White Bardakjik—BARDAKJIK.

White Baltadjik—BARDAKJIK.

White Barnissotte—BARNISSOTTE, WHITE.

White Douqueira—DOUQUEIRA BLANCA.

White Genoa—GENOA, WHITE.

White Marseillaise—MARSEILLAISE, WHITE.

White Monaco—MONACO BIANCO.

White Mussega—MUSSEGA.

White Naples—MARSEILLAISE, WHITE.

White Rondella—RONDELLA BLANCA.

White Rose—ROSE BLANCHE.

White Saint Peter—SAN PEDRO, WHITE.

White Standard—MARSEILLAISE, WHITE.

White Toulouse—BLANCHE DE TOULOUSE.

White Verdal—VERDAL, WHITE.

White Versailles—BLANCHE DE VERSAILLES.

Wild Fig—CAPRIFIG.

Williamson.—Below medium; about 1½ by 1½ inches; shape round, slightly flattened at apex; no neck; stalk short to medium; ribs numerous, not greatly elevated, but still quite distinct from stalk to near the eye. Eye open, large, scales not protruding, but flat and level with the apex. Skin greenish yellow, evenly diffused, semitransparent, slightly downy; pulp and meat amber white around the eye; seeds very large. A very good fig—in the author's opinion identical with the White Marseillaise, which it resembles in every respect. Distributed by Mr. Williamson, of Sacramento. The above name is proposed until the true name be found, although the author is almost positive that it is identical with the Marseillaise White.

Wilson—SMYRNA. (See Smyrna figs p. 279.)

Winter Fig—NATALINO.

Yellow Angélique—ANGÉLIQUE.

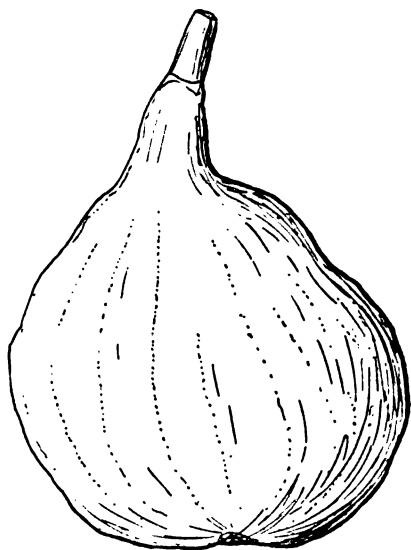


FIG. 93.—Versailles fig.

Zimitza.—Medium or below, longer than broad, turbinate; stalk large, about one-fourth as long as the fig; no neck; skin slightly downy, of a greenish olive color, mottled and dotted white or light yellow, lighter at the stalk end. Eye closed, scales greenish, shaded brown, iris light brown; pulp amber, with a slightly reddish center; leaves deeply but narrowly lobed. Good bearer and grower, and one of the latest of all figs. Dalmatia—possibly identical with Natalino. Specimens described were from trees imported from Dalmatia.

Ziza Kheden.—Large, oblong, color blackish violet; pulp red. Algiers.

SMYRNA FIGS.

Under the name of Smyrna figs we should include only such varieties as actually grow in Smyrna and which require caprification in order to set fruit. The practice to indiscriminately name varieties Smyrna figs should now be discarded, and the buyer of fig trees should insist upon having the pedigree of the trees sold. There are now fruiting in California some ten different varieties of these figs, some having proved to belong to the best types of Smyrna fig, grown in Smyrna for commercial purposes and distributed from that place all over the world. Most of the following varieties have fruited in California. The descriptions are based, for the most part, on observations during the season of 1901, after the preceding pages were in type and are inserted here because of the commercial importance of these varieties:

Bardakjik—*White Bardakjik; White Baltadjik; Bartadjic.*—Fruit large to very large, ovate, pyriform, with long neck and stalk. Skin very thin, greenish gray. Ribs distinct; light gray, covered with small gray dots. Eyes deep red. Pulp rich, deep crimson. Tree a compact grower, spreading. Leaves large, 5-lobed. A first-class table fig, also used for drying. The form of the fig resembles an Egyptian pitcher for holding water—bardak meaning pitcher—hence the name.

Bardakjik, Black—*Bartakjik; Black Bardakjik.*—Large, oblong, pyriform, black. A very fine table fig from Smyrna, Asia Minor, where with the white Bardakjik it is considered one of the very finest table figs. It will also dry well.

Blowers—*Blowers's Smyrna.*—Fruit medium, about 1½ inches long by 1½ inches wide. Ribs heavy. Neck crooked, with short stalk. Skin yellowish green, with gray bloom. Ribs darker than the other parts of the skin, which is spotted over with gray dots. Eye open, dark green. Flesh blood red, tender, and sugary, with a rich sirup. Seeds small, yellow. Tree medium of upright growth, with heavy branches. Leaf 9 inches wide by 10 inches long, 3-lobed, and a few 5-lobed. Both surfaces green, upper surface rough and glossy; veins yellowish green. Stalk of leaf about 3½ inches long. Edges of leaves indented. This very distinct variety was one of the Bulletin importation, and first planted on the place of R. B. Blowers, from which the tree at Niles is an offspring. The Turkish name is not known. Description partly from notes of Mr. J. C. Jones.

Kassaba—*Cassaba.*—Fruit medium to large, almost globular, somewhat flattened at apex. Neck short; stalk short. Eye large, open. Skin pale green. Pulp reddish pink. Seeds small. Very sweet. Tree an upright grower. (Roeding's description.)

Leker Ingir.—Fruit roundish, oblate, with short neck. Pulp reddish pink. Seeds small. Skin greenish ocher, very thin, with dark specks. Ribs distinct; light greenish. Tree a very strong grower, with heavy and closely jointed branches. Growth upright. Leaves very large, deeply cut, and slightly indented. Description after Schwarz. Imported by Roeding.

Lob Ingir—*Bulletin Smyrna; Commercial Smyrna (California); Erbeghli; Erbelli; Erbelli.*—Fruit large to very large, about 2½ inches wide by 2½ inches long; decidedly flattened like an onion, being compressed in the diameter of stem to eye. Neck thin, distinct but short, generally straight. No stalk or one very short. Ribs heavy, uneven, knotted and branching. Eye large, with numerous scales of amber tint, open and about three-sixteenths inch wide, so that the pulp can be seen through the opening. Skin the color of beeswax, smooth and waxy, shaded greenish. Pulp pale to dark amber; when unripe, shaded red. No distinct iris. Seeds large, flattened. Tree a strong, spreading, but rather straggling grower, with heavy branches, easily broken off through splitting. Leaves large, about 8 inches broad by 8½ inches long, with 5 thin, deep lobes, with dentiferous edges. Leafstalks heavy, about 3½ inches long. Color of leaves dark green on upper side, light green on under side. This fig is the best type of Smyrna fig, and the majority of figs imported from Smyrna to this country belong to this variety. This tree should be encouraged to branch close to the ground. It is now widely disseminated in California, and trees 20 years old are growing in many places, showing that

the variety thrives in various parts of that State. First imported by the Bulletin Company, later by Roeding.

Maple-leaved Smyrna—*Smyrna*, *Maple-leaved*.—Fruit medium, turbinate, rounded at apex, with short stalk and neck. No ribs. Eye wide open, dark yellow in color. Skin pale, yellowish green or greenish ochre, without any dark specks, in this differing from Leker Ingir. Pulp paler than that of Leker Ingir, honey colored, with red streaks. Tree of spreading habit, branches short jointed. Leaves large, deeply lobed, and serrated, standing upright. Description after Schwarz and Jones. Imported by Roeding.

Purple Smyrna—*Bulletin Black*; *Smyrna Black*.—Fruit medium to large, pyriform, flattened, about $2\frac{1}{2}$ inches wide by $2\frac{1}{2}$ inches long. A very short, curved neck characteristic of the variety. Stalk very short, about one-eighth inch long. Many ribs of even size. Eye flat, with 5 scales, surrounded by a dark and flat iris. Color of skin brownish purple shaded greenish. Pulp reddish brown. Flowers and seed small. Flesh violet white. Sirup sweet and highly flavored. When dried it makes a fine black fig, better than the Mission. Tree large, spreading, strong grower, and heavy branches. Leaves $9\frac{1}{2}$ inches long by 9 inches broad, 5-lobed, the end lobe the largest. Two of the sinuses are very deep. Stalk medium, about $3\frac{1}{2}$ inches. Imported first by the Bulletin Company, later by Roeding.

Round White Smyrna.—Fruit, large, about $2\frac{1}{2}$ inches long by $2\frac{1}{2}$ inches wide, almost globular, with a short neck; apex sometimes flattened; ribs plain. Skin tender, yellowish green with gray bloom, and with long, grayish spots. Eye grayish when ripe, pinkish when unripe, open. Pulp strawberry red, surrounded by a white flesh. A rich, white sirup, fig sweet and highly flavored. Seeds yellow, small. Tree a strong grower, spreading, heavy branches. Leaf very large, about 10 inches long by 9 inches wide, 3-lobed, a few 5-lobed, the point of the middle lobe making an angle of 90 degrees. Leaves dark green, upper surface rough, but glossy, under surface with yellowish-green veins. Edges of the 3-lobed leaves indented. Stalks about $3\frac{1}{2}$ inches long. A very fine variety. Also sent out as West's Smyrna, because it was first planted on West's place when imported by the Bulletin. The Turkish name not known. Description from notes by Mr. J. C. Jones, of Niles.

Small Purple Smyrna—*Smyrna*, *Small Purple*.—Fruit small, globular, with short stalk and no neck. Skin purple-olive, very thin, with light-gray ribs, dotted over with round, brownish dots. Pulp a dark amber or rose amber. Eye never opens widely. Tree small and dense, growing in the form of an umbrella. Turkish name not known. Imported by Roeding. Description after notes by Schwarz and J. C. Jones. Mr. Schwarz noted that the leaves of this tree are very large and that they drop from the tree earlier than those of any other Smyrna variety.

Wilson—*Smyrna*.—Fruit about 2 inches wide by $2\frac{1}{2}$ inches long; pyriform, with almost no neck or one that is very short; when present it is slightly bent. Stalk short, seldom more than one-fourth inch long. Ribs few, plain, large. Skin thin, green, covered with gray bloom and dotted over with numerous oblong, white specks. Eye medium, with five large scales edged with pink. Pulp very full, rosy red. Seeds small amber in color and very hard. Flesh white and very narrow. Tree a strong grower and of spreading habit. Leaves shallow, 3-lobed, about $7\frac{1}{2}$ inches long by 7 inches wide; under surface woolly; upper surface smooth and glossy. A valuable variety sent out by the U. S. Department of Agriculture in 1891 and labeled "Smyrna." It fruits only with caprification. The variety is named for the honorable Secretary of Agriculture, James Wilson, under whose administration as Secretary of Agriculture the *Blastophaga* wasps have been successfully introduced to California, and the culture of Smyrna figs been made a perfect and unqualified success.

CAPRIFIGS.

Most of the following caprifig varieties, twenty in number, are now growing in California in the experimental nursery at Niles. As far as is known, no caprifigs have previously been described, and it is to start an investigation of these varieties that the following descriptions are offered. The imperfections in some of the descriptions are due to the fact that some of the varieties have not yet come into full bearing in this country. The value of caprifigs is fully equal to that of the Smyrna varieties. The caprifigs, when first received, were simply labeled No. 1, 2, 3, etc., and much confusion has been the result. In order to help straighten out this difficulty I have here proposed new names for such varieties as were not properly named before.

Algiers No. 1.—Strong grower, with thick, upright branches. This variety was received by Mr. John Rock from the Department of Agriculture as being imported through Dr. Swingle from Algiers. No name was given. It has not yet fruited.

Algiers No. 2.—Medium growth, with slender, upright branches. Sent to Mr. John Rock from the Department of Agriculture as being imported through Dr. Swingle from Algiers. Has not yet fruited.

Brackett—Paul Meyer No. 2.—Profichi $1\frac{1}{2}$ inches wide by $2\frac{1}{2}$ long. Color green or yellowish-green. Male flowers abundant, with plenty of pollen. Gall flowers numerous. Tree a strong grower; main branches grow straight upward and side branches grow straight outward at an angle of 20° from the main branches, having a great tendency to spread. Not edible. One of the best caprifigs, according to Mr. John C. Jones, who has studied this fig at Niles. The tree was originally imported from Italy, having been sent me by Dr. Paul Meyer. As it has no Italian name I have named it for Col. Gustavus B. Brackett, Chief Pomologist, Department of Agriculture, Washington, to whom the fig growers of the United States are greatly indebted for his interest in this branch of horticultural science.

Bulletin—Capri Smyrna No. 4.—Profichi large, turbinate, with distinct neck. Color greenish-yellow. Numerous male flowers and pollen. Mammoni very rare. No mamme have ever set. Leaves large, rather entire. Tree a sturdy grower. This variety was the original caprifig imported to California by the Bulletin Company. The original tree is now dead, but younger trees have been started from cuttings. Differs from other caprifigs imported from Smyrna.

Howard—Solms-Laubach No. 3.—Insectiferous profichi, about $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ wide, with distinctly set and well-defined neck, the narrow part being three-fourths inch long. Fig ovoid-turbinate, with indistinct ribs. Eye large to medium in size, with very large scales of yellow color. Exterior male zone smooth. Color of skin brownish-violet with green on the neck. Meat with thin rim of violet. Male flowers confined to eye zone. Gall flowers are not closely set. Abundant pollen. Profichi all fall in the beginning of August. Polleniferous flowers much smaller, about $1\frac{1}{2}$ inches long by three-fourths inch wide. Meat without any violet. Mammoni numerous August 24, some being about 1 inch in diameter, though the majority are smaller, as large as peas. All are situated in the top of the tree. Tree of sturdy and robust growth. Leaves 3-lobed, about 6 inches long by 5 inches wide. This valuable caprifig was received from Professor Solms-Laubach, Naples. Named for Dr. L. O. Howard, Chief of the Entomological Division of the United States Department of Agriculture, who has done much to unravel the difficult question of caprification.

Large Wild.—Under this name Barron refers to a wild caprifig somewhat larger in size than SMALL WILD.

Maslin.—Leaves very large, entire, strongly hairy, on both upper and under sides; the under side being very rough, the upper side smooth. Profichi with many male flowers. Mammoni with few male flowers, but with many gall flowers. Many mammes setting about October 15, at San Francisco. Fig large, turbinate, with long stalk and distinct neck. Scales of eye, pink or red. Strong grower. A seedling accidentally raised in a garden in San Francisco. A very remarkable and undoubtedly valuable variety. One of the most promising, not only on account of its growth, but from the fact that being raised in California it is likely to be adapted to the climate of that State. Named for Mr. E. W. Maslin, of San Francisco, one of the first horticulturists in California to interest himself in Smyrna fig culture.

Meyer—Paul Meyer No. 1.—Profichi, $1\frac{1}{2}$ inches wide by $1\frac{1}{2}$ inches long. Color yellowish-green. Male flowers abundant. Gall flowers numerous. The tree is a strong grower, and the branches have a tendency to grow upright. Mr. John C. Jones, who has given me this description taken from the tree at Niles, Cal., considers this variety one of the best. The fig is not edible. This variety was sent to Mr. Rock and myself by Dr. Paul Meyer, of the Zoological Station at Naples, as a most valuable variety.

Milco—Endrich.—Insectiferous profichi, large, about 2 by 2 inches or less, globular or slightly lopsided. Skin pure green, smooth, and waxy, without any prominent ribs. Eye small, with pink-colored scales, and without any conspicuous iris. Figs are firm and rather hard even when ready for caprification. Male flowers confined to zone around the throat. Gall flowers are larger than on any other variety known so far, and very numerous, filling the whole of the cavity of the receptacle, the latter being shallow and not pointed at the bottom. Meat green with a broad violet zone. Not a trace of violet on the skin. The blastophaga from the profichi hatch from July to September, an unusual

length of time. The mammoni are more rounded and somewhat smaller than the profichi, beginning to set long before the wasps from the profichi have ceased to hatch. Tree a very strong grower and dense. Leaves large to medium, 5-lobed. Of all the caprifigs tried at Niles this is the most promising variety, being of remarkable growth and fertility, there being no cessation of crops the year around. This fig has also been sent out as Endrich. Originally imported by G. N. Milco from Dalmatia. It is the best variety that I have seen for holding and breeding the wasps.

Mitchell.—Leaves small to medium, the smaller leaves generally being 5 and 8 lobed, while the larger leaves are almost entire; surface rough and deep gray-green. The leafstalks are bright red, and in this respect differ from any other caprifig known to us in California. The profichi are turbinate, with long and distinct neck and stalk. As far as can be seen from uncapricated trees the figs are rough, lopsided, and when matured will probably be red. The profichi have more male flowers than any other variety seen by me. The profichi and mammoni crops overlap each other. This very interesting and probably very valuable variety was originated in a garden in San Francisco, probably from seed. The fig is named after Mr. George O. Mitchell, who has kindly donated the trees for further propagation.

Pingo de Mel—*Italian No. 3.*—Insectiferous profichi are very large to medium. Form turbinate, with a very short, distinct, and thin neck. Skin smooth and waxy, pale green, with indistinct ribs. Eye small, scales large, amber. Male zone distinct but small. Pulp and flesh white amber. Tree is sturdy and dense, of very good habit. Leaves medium to large, 5-lobed, rounded, with rounded lobes, deeply cut. The lobes are wide and overlap each other, so that the sinuses do not show well. Stems of leaves very long. The profichi are remarkable on account of their juicy pulp, which makes them desirable as a fine table fig. This fig was received through the Department of Agriculture from the Royal Horticultural Society of London under the name of Pingo di Mel. As this variety is a fine edible fig, no doubt the name is correct. As a caprifig its qualities have not yet been proven, the fig not having been capricated in time.

Rivers—*Italian No. 2.*—Insectiferous profichi medium, turbinate, with a very short neck and several distinct ribs. Color greenish without violet or brown. Growth dense and branches sturdy. Leaves thick, grayish-green, 5-lobed. This tree was imported many years ago by Mr. John Rock from Thomas Rivers & Son, London. The variety promises to be of great value on account of its strong growth. It is supposed to be of Italian origin.

Rock—*Solms-Laubach No. 2.*—Insectiferous profichi, about $3\frac{1}{4}$ inches long by $1\frac{1}{2}$ inches wide, oblong, pyriform, with long neck, the narrow part of the neck being about 1 inch long. About one dozen distinct ribs of darker color, the ribs being less dark than those in capri Schwarz. Eye medium, with yellowish-brown scales. Exterior zone of male flowers sunk and not prominent. Male flowers confined to zone around the eye. Pollen not abundant. Galls small and grayish-white. Meat whitish, streaked violet. Color of skin violet-mahogany, with numerous small oblong pits, generally of whitish color. Skin shaded greenish on the shady side. Polleniferous profichi: smaller, about $2\frac{1}{2}$ inches by $1\frac{1}{2}$ inches, rounded-turbinate. Neck shorter, narrowest part about one-fourth inch. Color of fig yellow-green with brownish flush. Male flowers confined to eye zone. Gall flowers all degenerated and shrunk. Little pollen. Meat yellowish-green with only very little or no violet around the male zone. Cavity of the receptacle rather shallow and rounded at the bottom. In the insectiferous profichi the receptacle is long and pointed in the bottom. Mammoni begin to set at Niles after August 24, none being visible at that date, most of the insectiferous profichi having then fallen. Tree of medium and spreading growth. Leaves of two sizes, some 3 by 3 inches, others 4 by 5 inches, 3-lobed. The smaller leaves are serrate, while the larger leaves are smooth and almost entire. A few leaves are 6 inches broad by 5 inches long. Received from Professor Solms-Laubach, Naples. It is named for Mr. John Rock, now owner of the largest assortment of fig varieties collected in one place.

Boeding—*Smyrna No. 1; Roeding No. 1.*—Profichi about $1\frac{1}{2}$ inches wide by $2\frac{1}{2}$ long. Neck well set, ribs distinct, but few. Skin smooth, waxy, of a pale yellowish white, shaded slightly rosy on the sunny side. Eye very small, amber. Cavity of receptacle small and rounded in the bottom. Gall flowers comparatively few. Many male flowers with plenty of pollen. Polleniferous profichi very small, with a minute central cavity. Tree not dense, limbs spreading and slender; leaves 5-lobed, a few 7-lobed; lobes pointed, deep, the sinuses running to or below the center of the leaf. The profichi on this fig are early, and of the three Smyrna caprifigs it is the best for carrying

wasps in the profichi (according to observation of Mr. John C. Jones). The fig was first imported by Mr. Fred. Roeding from Smyrna.

Schwarz—Solms-Laubach No. 4.—Insectiferous profichi, about 2½ inches long by 1½ inches wide. Neck distinct and well set, the narrow part one-half inch or so long. Skin smooth, but not waxy, slightly wrinkled and with many indistinct and narrow ribs. The ribs are darker than the skin and the fig appears striped. Color of skin deep mahogany-brown violet, shading to lighter on the side and neck. Eye large, somewhat protruding, with small red scales and a distinct dark iris outside of which is a hard and light-colored zone, indicating the extent of the male-flower zone. Male-flowers fill not only the zone around the eye, but extend far down the sides of the receptacle in streaks. Pollen not abundant. Meat is yellow, streaked violet and red. Tree is robust, with strong branches. Leaves below medium, 5-lobed as a rule, but some are also 3-lobed, rather entire in outline. Average leaf about 6 inches long by 7 inches wide. Many profichi left on August 24. Many mammoni of the size of a pea at that date, the largest being 1 inch in diameter. They commenced setting about August 1. This fine caprifig was also received from Professor Solms-Laubach, Naples, Italy. Now named for E. A. Schwarz, of the United States Department of Agriculture, whose investigations on caprification and the blastophaga are of the greatest value.

Small Wild.—Under this name, Barron mentions a small, white caprifig, native of Spain. Another caprifig of larger size he calls **LARGE WILD**.

Smyrna No. 2.—Insectiferous profichi; turbinate, about 2½ inches long by 1½ inches wide. Neck thin, distinct, and well set. Ribs many, indistinct. Eye medium, amber color. Skin smooth, glossy, pale green. Cavity of receptacle shallow, rounded. A deep violet margin around the cavity. Excellent for carrying wasps in the mamme. (Mr. John C. Jones.) Top dense, growth strong and upright. Leaves smaller than in Smyrna No. 1, with rough surface, 5-lobed, the end lobe the longest. Leaf is longer than wide and with long stalks. First imported by F. Roeding.

Smyrna No. 3.—Profichi in size and color as Milco, rounded turbinate and greenish yellow. Male flowers abundant. Gall flowers numerous. Color of flesh white with purple tint; not edible. Tree a strong, upright grower, with slender branches and small leaves. The best of the Smyrna varieties, according to Dr. Schwarz and Mr. J. C. Jones.

Solms-Laubach—Solms-Laubach No. 1.—Insectiferous profichi about 3 inches long by 2½ inches wide. Form lopsided, turbinate, with about 10 double ribs, especially distinct on the neck. Skin somewhat waxy and not downy. Neck distinct but short, the narrow part being about one-half inch long. Color dull mahogany brown, with violet flush in sun, the shaded side being green. Eye medium, with brownish black scales. No distinct iris. Polleniferous exterior zone not prominent. Male flowers numerous and full of pollen, situated mostly around the throat, though single male flowers are scattered all through the cavity of the receptacle. Meat yellowish white, with a few violet streaks. Mammoni begin to set at Niles about August 24. A number of insectiferous profichi left at that date. Tree slender, growth weak but dense. Leaves small, green, 5-lobed, deeply cut, and about 5 inches in diameter. Received from Professor Solms-Laubach, Naples.

Swingle—Algiers No. 3; Capri Smyrna No. 4.—Mamme large, greenish-yellow, with an abundance of gall flowers. This tree was imported by the Department of Agriculture from Algiers and was the original tree from which the blastophaga on the Roeding place emerged in the spring of 1899, and from which all blastophaga in California have descended. The true name is not known by the writer. This tree does well at Niles. It is now named for Dr. Walter T. Swingle, of the Department of Agriculture, through whose agency the blastophaga were first successfully established in California.

Taylor—Troano; Italian No. 1.—Insectiferous profichi medium, of a light-green color, with a purple tint. Mammoni large, round, and very early, the earliest of any variety so far under examination. Leaves large, shallow, 3-lobed or entire, about 8 by 9 inches long, very stiff. Growth medium, spreading. This variety was received from the Department of Agriculture, Washington, several years ago under the name of *Troano*. It is presumably an Italian variety, having been received by the Department under a wrong name. On account of its very early mammoni this caprifig will prove very desirable. As it is entirely hopeless to ever expect any identification of the Italian caprifigs which even in their native country do not possess special names, I have named this variety after Mr. William A. Taylor, Assistant Pomologist, United States Department of Agriculture, who has done much to promote the cultivation of the fig in the United States.

CHAPTER XVI.

CHEMICAL ANALYSIS OF SOILS AND FIGS.

The following analysis of soils from Smyrna fig districts was made at the agricultural department of the University of California, under the direction of Prof. E. W. Hilgard, and published in a bulletin of the California State Experiment Station:

Soil ingredients.	Asia Minor.		
	A.—Soil, Smyrna, sent from Department of Agriculture, Washington.	B.—Soil, Erbeyli district.	C.—Soil, Erbeyli, Aidin district.
	Per cent.	Per cent.	Per cent.
Coarse materials >0.5mm.....	35.00	1.00	40.00
Fine earth.....	65.00	99.00	60.00
<i>Analysis of fine earth.</i>			
Insoluble matter.....	67.19	76.33	84.29
Soluble silica.....	7.23	5.35	2.46
	74.42	81.68	86.85
Potash (K ₂ O).....	.55	1.09	.43
Soda (Na ₂ O).....	.12	.19	.07
Lime (CaO).....	4.44	1.96	1.40
Magnesia (MgO).....	2.29	1.56	1.17
Red oxide of manganese (Mn ₂ O ₃).....	.01	.01	.06
Peroxide of iron (Fe ₂ O ₃).....	5.22	6.49	3.42
Alumina (Al ₂ O ₃).....	4.21	3.25	3.18
Phosphoric acid (P ₂ O ₅).....	.37	.29	.30
Sulphuric acid (SO ₃).....	.04	.06	.03
Carbonic acid (CO ₂).....	2.65	1.00	.....
Water and organic matter.....	5.46	2.29	3.00
Total.....	99.78	99.87	99.91
Humus.....	.74	.27	.40
Ash.....	.33	.24	.40
Soluble phosphoric acid.....	.05	.03	.04
Silica.....	.19	.21	.24
Hygroscopic moisture, absorbed at 15° C.....	4.14	1.93	2.09

The soil B is the only one which with a certainty was taken from a fig orchard. It consisted of a fine gray alluvial loam, with a great quantity of very fine mica, and with no large or coarse grit or rocks, almost as light as dust. This soil is remarkable for its quality of preserving moisture—a soil very similar to that found in many of the California and Arizona bottom lands along rivers and creeks, as, for instance, in Kern County in the Weed Patch, along Kern River, along Kings and Sacramento rivers, Gila River, etc. The soil of the Meander Valley does not bake, but remains light even after wetting. It is, however, to be noted that the soil in that valley varies somewhat as to texture and capability of preserving moisture, and this more than its chemical constituents determines the quality of the figs, atmospheric conditions being equal. The above reference to the Meander

Valley soil should not be understood to mean that figs may not do as well in other varieties of soil, nor that the Pacific coast localities mentioned are preeminently suited for fig culture.

The following analysis of figs and other fruit was made at the agricultural laboratory of the California State Experiment Station at Berkeley, under direction of Prof. E. W. Hilgard:

The table below makes it evident that among California fruits the figs hold no mean place in sugar contents.

Percentages of sugar and acid.

Fruits.	Number of analyses.	Juice.		Sugars.	
		Acid.	Sugars.	Flesh.	Whole fruit.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Figs, White Adriatic	2	0.15	23.90		19.20
Other figs, from Tulare	9	.10 to .20	10.00 to 29.00		8.0 to 19.20
Apricots	11	.68	13.31	11.98	11.10
French prunes	13	.31	23.69	19.70	18.53
Plums	3	.48	17.97	13.25	12.89
Peaches	2	.24	17.00	13.40	12.50
Grapes		.50	24.00	23.00	20.70
Oranges	80	1.28	10.68	7.12	5.40

The acid of the figs, expressed in terms of sulphuric (SO₃) for the sake of comparison, seems thus to be very much lower than that found in any of our other fruits.

NUTRITIVE VALUES—NITROGEN CONTENTS.

Without repeating what has already been published by this station in its fruit bulletins relative to the importance of the flesh-forming ingredients (albuminoids) of our fruits, we give below, in tabular view, the average amounts of these materials contained in some of the fruits we have examined and considered. Added to this are such data from European sources as are at hand.

Average percentage of albuminoids.

Fruits.	Number of analyses.	Total in whole fruit.	Calculated to whole fresh fruit.	
			In the fresh flesh, or edible portion.	In fresh pits or rind.
<i>Figs.</i>				
California:				
White Adriatic	2	1.50	(1.50)	.....
Others	6	1.20	(1.20)	.....
Europe		1.42	(1.42)	.....
<i>Oranges.</i>				
California	35	1.14	.76	0.38
Europe (Sicilian)		1.78		.....
<i>Apricots.</i>				
California	11	1.25	1.068	.162
Europe		.49		.....
<i>Prunes.</i>				
California	20	1.012	.837	.175
Europe		.780		.....
<i>Apples and pears.</i>				
Europe		.375		.....

As heretofore pointed out in Bulletin 101, the fig rates first in flesh-forming materials among our fruits; apricots and plums second; prunes and oranges third.

It is interesting to reproduce, at this point, a summary of the food constituents of some of our dried fruits as compared with the dried fig. In addition, the analysis of a sample of California raisin is here reported.

Percentage composition of dried fruits.

Contents.	Dried edible portion.		Raisins (Muscat).	Figs (White Adriatic).	Figs (imported Smyrna). ^a	Apples (Euro- pean).
	French prunes.	Apricots.				
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Water	25.20	32.44	18.95	25.00	21.08	38.00
Ash	1.50	1.38	1.55	2.24	1.80	1.40
Albuminoids (crude pro- tein)	2.80	2.90	4.00	4.50	4.08	1.70
Crude fiber						8.80
Nitrogen-free extract	29.77	32.18	2.30	10.11	10.18	21.60
Fat						
Sugar	40.58	29.59	72.50	57.60	62.50	32.00
Free acid, calculated as sulphuric (SO ₃)	.40	1.51	.70	.45	.40	2.00
Total	100.00	100.00	100.00	100.00	100.00	100.00

^a Analyzed at this station.

As stated in previous fruit bulletins, these results are too meager to serve as the basis for a general discussion of the relative food values of the fruits examined. However, we note some wide differences among the nutrients. For instance, the sugars and albuminoids, or crude protein, show considerable variation; the apricots, like the apples, yielding less than one-half as much sugar as the Muscat raisin, which contains nearly twice as much sugar as the prunes, and one and one-fourth times as much of that substance as the fig. European analyses of raisins show figures for sugar contents which differ but little from those we give here. Both raisins and figs, with respectively 4 and 4.5 per cent albuminoids (flesh-forming materials), stand from one and one-half to two times above the other fruits in this respect. The fig yields nearly twice as much ash as the other fruits here reported.

ASH COMPOSITION AND NITROGEN CONTENTS.

The fig stands second in amount of mineral matter withdrawn from the soil for equal weights of the various fruits. From European data we place grapes first in this respect, and from our own findings the orange third, and the prune, apricot, and plum fourth. We report an ash analysis of the White Adriatic fig from Kern County, and as the figures there represent a considerable district we can take them as a fair guide, the analysis of the ashes of other fruits from different localities in California having shown that the variations will not be great enough to vitiate the conclusions. But few European analyses of fig ashes are at hand, and their great discrepancies necessitate an analysis by us of the ash of an imported fig. The results obtained are given in the accompanying tables, and it will be noted that the figures agree, within the limits to be expected, with those we report for our figs.

The following table gives the amounts, in pounds, of vital soil ingredients extracted by the different fruit crops (for fruit alone) that will have to be replaced by fertilization:

Soil ingredients extracted by different fruit crops.

Fruits.	Total ash.	Potash.	Phosphoric acid.	Nitrogen.
<i>Figs.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Europe: <i>a</i>				
In each 1,000 pounds	8.00	3.89	0.89	2.27
Crop of 15,000 pounds	120.00	58.35	13.35	34.05
California (White Adriatic):				
In each 1,000 pounds	7.81	4.69	.86	2.38
Crop of 15,000 pounds	117.15	70.45	12.90	35.70
<i>Grapes.</i>				
Europe:				
In each 1,000 pounds	8.8	5.00	1.52	1.70
<i>California apricots.</i>				
In each 1,000 pounds	4.91	2.90	.64	1.94
Crop of 30,000 pounds	147.30	87.00	19.20	52.20
<i>California prunes.</i>				
In each 1,000 pounds	4.86	3.10	.68	1.62
Crop of 30,000 pounds	145.80	93.00	20.40	48.60
<i>California oranges.</i>				
In each 1,000 pounds	4.32	2.11	.53	1.63
Crop of 20,000 pounds	86.40	42.20	10.60	32.60

a Imported; analyzed at this station.

With the exception of the grape, it seems that the fig draws rather more heavily upon the mineral ingredients that will need to be replaced by fertilization than do any of the other fruits we have examined, following closely the amounts taken up by the grape and fig of foreign growth. As compared with the fig, apricots and prunes, like oranges, do not in any case draw nearly so heavily upon the mineral matters. Lemons and plums, however, very nearly approach it. And among the figs we note that the White Adriatic stands somewhat above the other figs in this respect. As to nitrogen, it is readily seen that among our fruits the figs, on the whole, draw decidedly the highest amount and are quite like those of foreign production in this regard. Here again the White Adriatic appears to lead.

Potash.—In the ashes of the fig, as in the prune, apricot, orange, and lemon, we find potash to be the leading ingredient, amounting to about three-fifths of the whole ash. From the partial ash analysis, given above, of the imported Smyrna fig, we find the potash to be four-fifths as much as is contained in the ashes of figs of California growth.

TABLE OF SOIL ANALYSES.

The comparison of the analyses of the Asia Minor soils with those from this State shows very strikingly the richness in phosphoric acid of the former over the latter. The lowest percentage of this ingredient in the Asia Minor soils, 0.29 found in soil B, is more than one and one-third times as much as the highest, 0.22 shown in soil No. 1466, of the California soils, and the average, 0.32 per cent, of the three Smyrna soils is almost exactly four times the average for all California soils examined (about 200 in number) and nearly three times the figure 0.113, denoting the average of phosphoric acid for 466 soils of the humid region (east of the Rocky Mountains) of the United States.

With reference to lime, the average for the Asia Minor soils is 2.60 as against 1.08 for California. The figures 0.690 for Asia Minor and 0.644 for California, repre-

sending the averages for potash, show that both sets of soils are about equally well supplied with this element of plant food.

Below is a tabular view of the averages just discussed:

Average percentages of the important ingredients in soils of arid and humid regions.

Soil ingredients.	Arid.		Humid.
	California (average of 196 soils).	Asia Minor (average of 3 soils).	United States east of Rocky Mountains (average of 406 soils).
Potash	0.644	0.690	0.216
Lime	1.078	2.600	.108
Phosphoric acid	.068	.320	.113
Humus	1.040	.470	2.360

The above little table conveys a forcible illustration of an arid region showing far greater amounts of potash and lime in its soils than does a humid one.

Chemical analysis of the ashes of a Smyrna fig (Eleme)—after Wohltman.

	Per cent.
CaO	18.9
MgO	9.2
P ₂ O ₅	1.3
KO	28.4
NaO	26.3
Fe ₂ O ₃	1.5
Cl	2.7
SO ₂	6.7
SiO ₂	5.9
Total	100.9

Analytical table of figs from various localities.

[The second numerals are from samples absolutely dry.]

	Smyrna, Eleme (Asia Minor).	Palermo (Sicily).	Vallo (Cosenza).	Belvedere maritimo (Cosenza).	Rocanova allicata.	Taranto (Terra d'Otranto).	Brindisi (Terra d'Otranto).	Melpignano (Terra d'Otranto).	Monopoli (Terra di Bari).	Turi (Terra di Bari).	Cilento (Province Salerno).	Sorrento (Penin- sula Sorrentina).	Ischia (Gulf of Naples).	Sora (Terra di Lavoro).
Water	17.31	17.90	20.30	23.00	19.76	20.49	19.12	20.04	18.40	23.30	18.04	18.96	22.30	18.60
Sugar	58.00	60.98	60.02	61.00	59.30	57.04	59.85	58.56	61.18	57.02	62.90	58.75	60.80	58.60
Albumen	72.53	74.06	75.30	79.23	73.93	72.61	74.00	73.61	74.07	74.34	76.74	72.48	78.28	69.53
Fat	5.70	5.45	5.01	3.85	4.08	5.00	5.04	4.30	5.18	4.06	4.97	4.90	3.70	5.30
Starch	7.13	6.63	6.28	5.00	5.02	6.28	6.22	5.37	6.34	5.23	6.06	6.04	4.89	6.51
Pectose and pectin	3.0	6.19	6.80	6.00	7.02	7.03	6.41	5.92	6.91	5.00	6.39	6.30	4.99	5.90
Fiber	7.37	7.67	7.94	7.65	8.77	8.04	8.03	7.18	8.49	6.53	7.81	7.77	6.17	7.26
Ashes	0.96	1.86	0.97	0.94	0.99	1.39	0.89	1.96	2.14	2.06	0.96	2.04	1.72	2.30
Total	1.23	2.25	1.21	1.22	1.23	1.74	1.10	2.47	2.62	2.68	1.15	2.51	2.21	2.82
Medium weight	6.94	4.90	4.70	3.40	5.90	5.92	6.18	6.20	4.04	5.92	4.06	5.21	3.58	7.40
	8.68	5.96	5.89	4.42	7.35	7.40	7.65	7.87	4.95	7.72	4.95	6.42	4.50	9.00
	2.45	2.81	2.70	1.91	3.00	3.13	2.51	2.70	2.15	2.65	2.70	5.85	3.00	4.90
	3.06	3.42	3.38	2.48	3.73	3.92	3.00	3.50	2.63	3.45	3.29	4.78	3.97	4.79
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Medium weight	20.03	21.5	11.5	10	9.60	10.5	10.5	10.62	11	8	10	8.4	9	7.60

CHAPTER XVII.

STATISTICS OF THE PRODUCTION AND IMPORTATION OF FIGS.

Compiled by E. W. MASLIN, *San Francisco, Cal.*

The production of dried figs in California can only be approximately estimated, as there are no statistics in the possession of the various railroads in the State which make a distinction between figs and other dried fruits. Of the many small lots of dried figs which are produced everywhere all over the State of California no account is taken. Dried figs are used for cooking and pickling in almost every family on the Pacific coast, and the total amount thus produced and consumed must be very large. Thus figs are constantly brought in from the country farms to the smaller towns and consumed there. Our only detailed statistics are had from the special packers of figs, the most prominent of which are found in the San Joaquin Valley in California. These packers estimate the output of dried figs shipped outside of the valley at 300 carloads, at 10 tons each. This makes for the whole valley of the San Joaquin 3,000 tons, or 6,000,000 pounds. If we presume that the total output of dried figs from all of California is at least 350 carloads, or 7,000,000 pounds, it will be seen that California alone produces now at least one-half of the quantity of dried figs consumed in the United States. But this estimate is entirely too low. The true figures are undoubtedly at least 1,000,000 pounds higher.

The following tables show for ten fiscal years the quantity and value of figs imported from Turkey in Asia and from all foreign countries:

Quantity and value of figs imported into the United States during the ten years 1890-1899, and the proportion furnished by Turkey in Asia.

Fiscal years ending June 30—	Total imports.		Imports from Turkey in Asia of the amounts in preceding columns.	
	Quantity.	Value.	Quantity.	Value.
	<i>Pounds.</i>		<i>Pounds.</i>	
1890	9,986,993	\$442,924	6,906,616	\$301,112
1891	9,063,663	672,141	6,199,124	486,767
1892	8,324,861	510,591	4,904,942	314,669
1893	10,508,928	548,995	8,426,723	355,643
1894	7,985,959	362,040	4,624,268	224,174
1895	11,855,890	587,420	7,224,131	378,679
1896	11,900,710	639,512	10,286,906	563,851
1897	8,940,762	535,380	7,416,300	449,844
1898	9,628,426	509,002	6,872,867	406,213
1899	7,224,058	356,762	1,609,797	189,728
Total	96,455,250	5,194,767	64,548,664	3,680,710

The per cent of the importation from Turkey of the whole importation is as follows: Of quantity, 67.6 per cent, and of value, 70.8 per cent. The average value at the port of export from all countries is 5.4 cents per pound; the average value of figs from Turkey in Asia is 5.7 cents per pound. Add to this cost the present tariff of 2 cents per pound and the freight to the United States, and the result is a substantial basis upon which to estimate the profitable production of figs in the sections of this country adapted to their culture.

It must be remembered that the value on invoice values at the port of export average 5.7 cents, but the sales in New York at auction show that figs bring at auction all the way from 9 cents to 28 and 30 cents per pound.

The small quantity of figs imported in 1899, as shown by the following table, is probably due to their shipment to England and thence to the United States:

Table showing countries from which figs were exported to the United States, with quantity and value, in the fiscal year 1898-99.

Countries.	Quantity.	Value.
	<i>Pounds.</i>	
Belgium	553,075	\$13,195
France	34,774	4,149
Greece	161,254	4,090
Italy	635,026	22,130
Portugal	43,327	1,063
Spain	91,343	2,471
United Kingdom	4,123,238	118,411
Dominion of Canada	24,795	849
Mexico	757	49
West Indies	800	27
Hongkong	20	1
Turkey in Asia	1,009,797	189,728
Turkey in Africa	5,952	571
Total	7,284,058	356,762

The imports of figs from the United Kingdom for the fiscal year ending June 30, 1899, were 4,123,238 pounds; value, \$118,411. The imports for 1898 were 2,242,231 pounds; value, \$86,684. For 1897, 1,182,246 pounds; value, \$75,451.

It will be seen, however, that the amount of figs imported show a varying decrease since 1896, probably due to the progress of fig culture in California, from which State were exported to the East by rail in 1899 over 500 carloads.

CHAPTER XVIII.

HOUSEHOLD RECIPES.

Few fruits have been so neglected in this country as the fig, and, except in some of the Southern States and in southern California, the practical value of figs is almost unknown. What dried figs are sold at the fruit stands and in the grocery stores go principally to the tables of the wealthy merely as a luxury. In the Mediterranean countries the use of the fig is a very different one. There the fig is a staple article of food for the common people, and hundreds of thousands of tons are yearly consumed, as we do wheat and corn. The failure of the fig crop would be a serious matter, indeed, as a large part of the population depends upon the fig as a winter food. Without expecting or desiring any similar conditions to find place in this country, the author believes that, if the true value of the fig and the many uses to which it could be put were known, fig culture would be greatly extended, and a very large trade would spring up, beneficial to the grower, the carrier, the consumer, and the whole country.

The fig is one of the most nourishing of all fruits, and if properly prepared would be considered a most delicious one. Canned figs, stewed figs, fig sauce, etc., are in many places, even in this country, eaten daily in many families and highly valued. Canned figs especially are very fine, and if properly put up by our canneries would soon find a market in northern and eastern countries, where the figs are as yet almost counted among fabled fruits. For the benefit of those who wish to try figs in different ways, the following recipes have been collected, and nearly all of these have been tried by the writer:

Steaming figs.—This should be done always in closed but not tightened jars. Families may best use a common wash boiler, furnished with a loose inner perforated bottom of tin or galvanized iron, kept from the bottom by four stout legs soldered to the loose bottom. The space below the bottom is nearly filled with water. The jars, with fresh figs, are placed above, and finally over the boiler is put its regular cover. This is a much better way than boiling the figs in kettles of any kind over direct fire, as it prevents burning or mashing of the figs, saves handling, preserves the flavor, etc.

Preserved figs.—Gather the figs with the stems on just before they are ripe enough to be eaten. Scrape off the skin carefully and drop the figs into a kettle of clear, boiling water, and leave half an hour. Then take out and allow to cool with the stems up. Make a sirup of a pound and a half of sugar and a half pint of water to each pound of fruit. Boil the sirup till nearly roping; put in the figs carefully and keep them under the water while cooking. If other than the natural flavor is desired, put a clove in the blossom end of each fig or cook them with a sliced lemon from which the seeds have been removed, adding a little ginger. The preserves keep well if made with an equal weight of sugar and figs.

Preserved figs with ginger.—Ten pounds of fresh ripe figs, not shriveled, are peeled of the thick outside skin. As not all figs are peeled readily, a variety which peels must be selected. Take the peel of one orange or lemon, pare well, and use none of the inner white part or rag. Take one ginger root and shave very thinly with a sharp knife. Boil the peel and ginger until very tender in a separate kettle. In another kettle make a sirup of 6 pounds of best white sugar, enough water to dissolve; add the juice of four oranges and one lemon or four lemons. When ready, add the decoction of the orange peel and ginger, but take care to first strain. Bring the sirup to a simmer, drop in the peeled figs and simmer under cover until clear and tender, which requires more or less time, according to the variety of figs used and their state of ripeness.

Pick before quite ripe, peel and put in shallow dishes, with sugar, for twelve hours, usually overnight; drain off juice into preserving kettle, and after coming to a boil put in figs for a short time; take up in dishes again and expose to sun while sirup is boiling down; then return figs, and when they begin to look clear take up and expose to sun again while reducing sirup to desired thickness; then return figs to sirup and let simmer gently for an hour, being careful not to have too hot a fire and thus burst the figs; use a pound of sugar for each pound of fruit.

Pick figs fully ripe, but not shriveled. Scald first in hot water, change water several times in order to draw out the milky juice. Pack figs in glass jars in rows and handsomely. Make a sirup of one cup sugar to two of water. Pour over figs, and steam for twenty minutes, without rubber band. Then place on the rubber bands; steam for twenty-five minutes more with the cover lightly pressed down. A very superior article is made if the figs are first steamed in a colander until tender, then packed in glass and steamed with the sirup. An apricot kernel or a bitter almond may be added to each jar, or, better, grated and boiled with the sirup before pouring over the figs. No more than one kernel is needed for each jar.

Fig preserves.—Gather the fruit when fully ripe, but not cracked open; place in a perforated tin bucket or wire basket and dip for one moment into a deep kettle of hot and moderately strong lye (some prefer letting them lie an hour in lime-water, and afterwards drain); make a sirup in proportion of 1 pound of sugar to 1 of fruit, and when the figs are well drained put them in the sirup and boil them until well cooked; removing, boil the sirup down until there is just enough to cover the fruit; put the fruit back in the sirup, let all boil, and seal while hot in glass or porcelain jars.

Canned figs.—To 3 quarts boiling water add 2 heaping tablespoonfuls soda; now dip your figs in the water for one minute and skim them out; then wash them thoroughly in two or three waters, or until there is no color left in the water. To 10 pounds of figs allow 8 pounds of sugar; add just enough water to dissolve the sugar; when boiling hot, drop in the figs, having first selected them with care so as to avoid any that are broken or overripe; let them simmer slowly two hours; now remove the figs and boil down the sirup until quite thick; replace the figs; bring all to a boiling heat, after which they are ready for canning after the usual method. A few slices of lemon with its juice will improve its flavor.

White-fig marmalade.—A delicious marmalade is made from white figs. Take perfectly ripe and fresh figs, peel off the thin, soft skin, and to every 2 pounds of figs use 1½ pounds of sugar and the grated peel of a large orange or lemon; cut up the figs and mash them with the sugar, adding the grated yellow rind and juice of the orange or lemon; boil all together until the whole is reduced to a thick, clear, smooth mass, stirring frequently from the bottom. When done, put into jars while hot and cover closely.

Those who like less sugar can use one-half pound of sugar to a pound of fruit, and it will keep perfectly, provided it be boiled very clear and smooth.

Fig pudding.—Two pounds of dried figs, 1 pound of suet, one-half pound of flour, one-half pound of bread crumbs, 2 eggs, spices to taste, one-fourth pound of candied lemon peel, one-fourth pound of brown sugar, milk.

Mode: Cut the figs into small pieces, also the lemon peel; grate the bread finely and chop the suet very small; mix these well together; add the sugar, spice, and flour; the eggs should be well beaten, and sufficient milk to form the whole into a stiff paste; butter a mold, press the pudding into it very closely and tie it down with a cloth, and boil four hours or rather longer; turn it out of the mold and serve with lemon sauce, wine sauce, or cream. Sufficient for seven or eight persons. Suitable for a winter pudding, as it should be made with the dried white fig.

Beat one-half pound of sugar and one-fourth pound of butter to a foam. Add yolk of 3 eggs, one-half pound of finely chopped figs, one-half pound of grated bread crumbs, one-half cup of milk, pinch of salt, white of 3 eggs beaten stiff. Boil all for three hours. Serve with white wine or hard sauce.

Chop one half pound of figs very fine. Mix with 2 tablespoonfuls of butter and add one-third cup of powdered sugar, 2 eggs beaten lightly without separating yolks from the whites, 1 cup of milk, one-fourth cup of cake crumbs. Mix well and turn into a well-pressed mold and boil for three hours.

Stuffed figs.—Use "bag figs" which have not been pressed. Cut a small slit in the stem end of each fig and work in 2 or more blanched almonds.

Another mixture which is very palatable is a paste made from almonds, walnuts, and hickory nuts, to which are added a few drops of sherry. A portion of the soft meat of the figs is first taken out, using a knife or a small pointed spoon. The fig is now filled with the paste. When filled, press the opening and roll in granulated sugar.

Fig tart.—Select a dozen choice dried figs and stew them in enough water to cover them. Add 2 cloves, a small piece of stick cinnamon, and a piece of preserved ginger, chopped fine. When tender, take out the figs and remove the spices. Add enough sugar to the water to make a good sirup and a couple of spoonfuls of ginger sirup. Then boil for five minutes, and add a little hot water if it gets too thick. Next add a teaspoonful of lemon juice and a spoonful of brandy. Return the figs to the sirup and set aside to cool. Put 1 or 2 figs and a spoonful of the sirup in each tart shell before serving.

Whip one-half cup of rich cream until stiff, and sweeten slightly. Add one-half cup of dried figs, cut fine, preferably into minute dices, by aid of a sharp knife. Stir these very lightly into the cream and sugar a few at a time. Fill puff-paste shells with the mixture and sprinkle with maple sirup or dust with cinnamon, according to taste.

Fig marmalade.—Use only fully ripe figs. When they are considerably wilted they are cut. Cut in halves and scrape out the inside pulp; mash and strain through a very coarse sieve. Put into a glazed dish and place the latter in boiling water. Boil constantly for one-half hour and then preserve in sealed glass jars, like canned fruit. This marmalade is very fine; can be eaten with meat or alone with cream. It is a fine relish if made from good, sweet figs.

Fig jam.—Boil sweet dried figs with some sirup till all the juice is thick and sirupy, then run figs, sirup and all, through some kind of a mill that will grind it into a paste. A small sausage grinder is best—one that grinds fine. This paste is fine for use wherever a jam can be used, and can be made more easily than any jam or jelly.

Fig paste.—(1) Pick the figs fully ripe, split and scrape off the pulp, mash and strain and let come to a boil, constantly stirring. To 10 pounds of fig pulp add 1 pound grated cocoanut and the juice of one lemon. After boiling a half hour spread on plates and dry in the sun. When fully dried keep in air-tight place if possible. When ready to use soak in warm water overnight and boil in the same water.

(2) Figs must be very ripe. Wash in water, steam in colander for a few minutes, then rub through a sieve, using best rubber gloves on the hands. The rubber gloves must have been previously washed several times in hot water in order to remove the taste of the rubber. The mushy pulp is then placed in jars and steamed for forty-five minutes or more. If not sweet, add sugar to taste, spread the mush on glass or marble to dry in the sun or in heated air. Fig sauce is made in the same manner, except that it is preserved in jars while yet mushy instead of drying in the sun.

(3) Pick the figs when well ripened, but not so soft as to be difficult to handle. Peel them, weigh, and allow three-fourths of a pound of best granulated sugar to 1 pound of fruit. Mix sugar and fruit thoroughly with your hands, or by mashing together with a large potato masher, and let the mixture stand overnight. Prepare the afternoon before if the weather is very hot, but if it is not they can stand from one forenoon to the next. In the morning put them on the back of the stove and let the paste heat slowly, stirring occasionally. Then when ready to give it your whole attention pull forward and "cook down" over a rather slow fire, stirring and mashing almost constantly. There must not be a single lump left in the mass. If wished, some of the seeds which rise and accumulate on the sides of the preserving kettle may be skimmed out. The amount of "cooking down" done is according to taste. The paste is nicer when cooked down a good deal, but if one does this great care must be taken not to burn the paste at the last, when it is quite thick. It is so rich that for small families it had perhaps better be put into pint or half-pint jars.

Figs and grapes preserved together.—White figs and Muscat grapes are sometimes preserved together, the second crop of figs coming in season to can with the grapes.

Pick the figs when their skins begin to crack: peel, weigh, and allow one-half pound of best granulated sugar to 1 pound of the fruit. Mix the fruit and sugar carefully (not breaking the figs), and let stand overnight. In the morning cook slowly on the back of your stove, stirring carefully at intervals. In the morning also prepare your Muscat grapes by picking them from their stems, washing, weighing, and allowing one-fourth pound of sugar to 1 pound of fruit (and as many grapes by weight as figs). Cook in another kettle, using only a very little water—just enough to keep them from burning. They will cook, after starting to boil, in about ten minutes. The figs will need cooking nearly an hour. When both fruits are done, mix carefully together, let come to a boil, and can.

Pickled figs.—Seven pounds of figs picked just before shriveling, 3 pounds of white sugar, 1 quart of vinegar, 1 teaspoonful of salt, 1 teaspoonful of allspice, 1 teaspoonful of ginger, 1 tablespoonful of cloves, 2 tablespoonfuls of cassia buds. Boil together for four hours, put spices in a thin bag to keep pickles clear, and more vinegar if too much evaporates, and add the sugar when nearly ready. When the sugar is dissolved, add the figs. Simmer until tender.

To 10 pounds of figs take 4 pounds brown sugar, 1 quart strong vinegar, 1 large cup of whole spices of the following kinds: Cloves, cinnamon, allspice, and cassia buds. Boil vinegar, sugar, and spices first, and when sugar is well dissolved add the figs and boil until tender. The figs should have been picked before being shriveled. Put all in jars; pour out the liquid for three mornings, and let come to a boil and return to the figs; then close the jars.

Spiced figs.—Peel ripe white figs, and to 10 pounds of the figs add 5 pounds of brown sugar, 1 quart of vinegar, 1 ounce of cinnamon, one-half ounce allspice, one-half ounce cloves, the spices to be tied in bags and boiled with the sugar and vinegar. When the vinegar and spices have come to a boil add the figs, a few at a time, to prevent mashing, and boil until they look clear. When all are done put into jars and pour the vinegar over them hot.

Sweet pickled figs.—The figs are picked when ripe, but must not be soft. Steam first until slightly soft, then place in a liquor made as follows: A sirup is made of

a cup of sugar; to every cup of water add a teaspoonful of cider vinegar, one stick of cinnamon, crushed in small pieces. Boil the liquor. Insert a clove in the eye of each fig and pack in a glass jar. Pour the filtered liquor over the figs. Steam the jars first with the cover on loosely for twenty-five minutes. Then place on the rubber bands, screw down cover lightly, and steam for twenty minutes more.

Crystallized figs.—The figs must be picked when fully ripe, but before they are shriveled. Take figs of as even a size as possible in order to save assorting afterwards. Simmer in a kettle for twenty to thirty minutes, but do not allow to boil. When ready the figs will have become clear and semitransparent. Drain off the water. Prepare a strong sirup of best white sugar and drop the figs in. Keep this in a cool place. In from twenty-four to thirty-six hours the figs will have absorbed most of the sugar and the sirup become very weak. Draw off the sirup, add more white sugar, and thus make the sirup stronger. Simmer, but do not boil. Drop the figs in and test again in twenty-four hours. If the sirup is weak renew the process. When the sirup retains its strength, the process is discontinued. Prepare a very strong sirup of best white sugar; simmer, but do not boil. Previous to this the figs are dried in the sun or in drier until they slightly ring when dropped on a stone floor. The figs should, however, not be so dry that they can not be readily indented when pressed between the fingers. Now immerse these dried figs for a few seconds in the strong, hot sirup, then drain off and place on wire trays in a hot-air drier or in the hot sun, if on a warm day. The sirup dries quickly and leaves the figs glacé. If crystallized figs are wanted, the figs are slowly dried in the shade, in which case the sirup crystallizes instead of producing a glacé.

Candied figs.—Are made only from young green figs not yet fully ripe. Place in glass jars, pour on salt water, and steam until soft. Pour off the salt water and pour over a sirup made of one cup of sugar to three of water. After a day take out, place on wire screens, and allow to drip for one or two days in a warm place. Place again in jars or earthenware; cover with a sirup made of one cup of sugar to one and one-half cups of water. After a day take out and allow to drip. The third soaking should be in a sirup made of one cup of sugar to one-half cup of water. In this sirup the figs are allowed to remain as long as possible, or until required. Take out, drip, and roll in confectioners' powdered white sugar in a pan made lukewarm. When the figs have absorbed all the sugar they can they are taken out and packed in large boxes with powdered sugar. The preserved fruit is afterwards repacked in small boxes for the market.

CHAPTER XIX.

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CHAPTER XX.

TABLES OF TEMPERATURE, PRECIPITATION, AND HUMIDITY IN THE PRINCIPAL FIG REGIONS.

The following tables have been compiled for this bulletin by the Weather Bureau of the United States Department of Agriculture. As the temperatures are given in degrees centigrade and Fahrenheit, a table is appended showing the relative value and corresponding degrees of the three principal thermometers in use. Precipitation is expressed in inches or millimeters. In order to reduce inches to millimeters multiply the given number of inches by 25, or, to be more accurate, divide the given number of inches by 4 and then multiply by 99. On the contrary, in reducing millimeters to inches divide the given number of inches by 25, or, to be more accurate, divide by 99 and multiply the quotient by 4. As 4 inches equal about 99 millimeters, the difference between the first method and the second is so slight as to be of little importance, making a difference of but three-fourths inch in 25 inches. The localities in the Old World have been selected as being representative places where figs are successfully grown. From Portugal no records have been obtainable. The localities in the United States have been selected, not because they are actually prominent fig districts, but in order to give a general idea of the conditions under which fig culture is practiced in this country. It is safe to say that the ideal fig districts in America have not yet been determined. Localities which as much as possible resemble the climatological conditions of the southern Mediterranean countries will probably be found to be the most suitable for the fig industry.

Table for comparison of thermometers.

Fahren- heit.	Centi- grade.	Reaumur.	Fahren- heit.	Centi- grade.	Reaumur.
212	100.0	80.0	168	75.6	60.4
210	98.9	79.1	166	74.4	59.6
208	97.8	78.2	164	73.3	58.7
206	96.7	77.3	162	72.2	57.8
204	95.6	76.4	160	71.1	56.9
202	94.4	75.6	158	70.0	56.0
200	93.3	74.7	156	68.9	55.1
198	92.2	73.8	154	67.8	54.2
196	91.1	72.9	152	66.7	53.3
194	90.0	72.0	150	65.6	52.4
192	88.9	71.1	148	64.4	51.6
190	87.8	70.2	146	63.3	50.7
188	86.7	69.3	144	62.2	49.8
186	85.6	68.4	142	61.1	48.9
184	84.4	67.6	140	60.0	48.0
182	83.3	66.7	138	58.9	47.1
180	82.2	65.8	136	57.8	46.2
178	81.1	64.9	134	56.7	45.3
176	80.0	64.0	132	55.6	44.4
174	78.9	63.1	130	54.4	43.6
172	77.8	62.2	128	53.3	42.7
170	76.7	61.3	126	52.2	41.8

Table for comparison of thermometers—Continued.

Fahren- heit.	Centi- grade.	Reaumur.	Fahren- heit.	Centi- grade.	Reaumur.
124	51.1	40.9	32	0.0	0.0
122	50.0	40.0	30	-1.1	-0.9
120	48.9	39.1	28	-2.2	-1.8
118	47.8	38.2	26	-3.3	-2.7
116	46.7	37.3	24	-4.4	-3.6
114	45.6	36.4	22	-5.6	-4.4
112	44.4	35.6	20	-6.7	-5.3
110	43.3	34.7	18	-7.8	-6.2
108	42.2	33.8	16	-8.9	-7.1
106	41.1	32.9	14	-10.0	-8.0
104	40.0	32.0	12	-11.1	-8.9
102	38.9	31.1	10	-12.2	-9.8
100	37.8	30.2	8	-13.3	-10.7
98	36.7	29.3	6	-14.4	-11.6
96	35.6	28.4	4	-15.6	-12.4
94	34.4	27.6	2	-16.7	-13.3
92	33.3	26.7	0	-17.8	-14.2
90	32.2	25.8	-2	-18.9	-15.1
88	31.1	24.9	-4	-20.0	-16.0
86	30.0	24.0	-6	-21.1	-16.9
84	28.9	23.1	-8	-22.2	-17.8
82	27.8	22.2	-10	-23.3	-18.7
80	26.7	21.3	-12	-24.4	-19.6
78	25.6	20.4	-14	-25.6	-20.4
76	24.4	19.6	-16	-26.7	-21.3
74	23.3	18.7	-18	-27.8	-22.2
72	22.2	17.8	-20	-28.9	-23.1
70	21.1	16.9	-22	-30.0	-24.0
68	20.0	15.0	-24	-31.1	-24.9
66	18.9	15.1	-26	-32.2	-25.8
64	17.8	14.2	-28	-33.3	-26.7
62	16.7	13.3	-30	-34.4	-27.6
60	15.6	12.4	-32	-35.6	-28.4
58	14.4	11.6	-34	-36.7	-29.3
56	13.3	10.7	-36	-37.8	-30.2
54	12.2	9.8	-38	-38.9	-31.1
52	11.1	8.9	-40	-40.0	-32.0
50	10.0	8.0	-42	-41.1	-32.9
48	8.9	7.1	-44	-42.2	-33.8
46	7.8	6.2	-46	-43.3	-34.7
44	6.7	5.3	-48	-44.4	-35.6
42	5.6	4.4	-50	-45.6	-36.4
40	4.4	3.6	-52	-46.7	-37.3
38	3.3	2.7	-54	-47.8	-38.2
36	2.2	1.8	-56	-48.9	-39.1
34	1.1	0.9			

Temperature and precipitation in fig districts.

SMYRNA, TURKEY.¹

[Latitude 38° 26' N.; longitude 27° 10' E.]

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).¹

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
19.6	20.1	24.7	27.8	32.8	35.3	38.1	38.0	33.7	31.4	24.4	20.3	39.6

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).²

-2.3	-2.8	1.0	4.2	9.5	14.4	15.8	15.6	11.4	7.8	3.0	-1.1	-4.4
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MEAN MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).³

13.4	15.0	18.7	20.1	27.7	30.9	33.3	32.8	29.2	25.4	19.0	14.8	
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¹ Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, VIII. Band, 1873.² Record for nine years.³ Record for seven years.

Temperature and precipitation in fig districts—Continued.

SMYRNA, TURKEY—Continued.

MEAN MINIMUM TEMPERATURE (DEGREES CENTIGRADE).¹

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
3.7	3.7	7.3	7.7	13.7	17.7	19.9	19.6	16.2	12.7	7.9	5.1	.....

MEAN TEMPERATURE (DEGREES CENTIGRADE).²

7.8	8.9	12.6	14.1	20.2	23.6	26.7	25.6	21.9	18.8	13.2	8.9	16.86
-----	-----	------	------	------	------	------	------	------	------	------	-----	-------

MEAN RELATIVE HUMIDITY (PER CENT).³

77	71	69	63	60	57	53	58	63	74	76	76	66.4
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PRECIPITATION (MILLIMETERS).⁴

115	66	107	32	20	21	8	4	23	39	106	73	612
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¹ Record for seven years.² Record for eleven years.³ Record for four years.⁴ Record for nine years. One millimeter (mm.) = 0.03937 inch, or approximately 0.04 or $\frac{1}{25}$ inch.

The individual values are not obtainable. The record is from the city of Smyrna and not from the fig districts, which are situated farther inland and where the temperature and rainfall must differ somewhat. From the fig districts no records are obtainable.

ATHENS, GREECE.

[Latitude 37° 58' N.; longitude 23° 44' E.; elevation 337 feet.]

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
46.76	48.00	52.39	59.07	67.91	76.01	80.80	80.15	74.16	65.75	57.24	49.77	63.14

ABSOLUTE MAXIMUM (DEGREES FAHRENHEIT).

69.44	73.58	83.12	91.40	100.58	104.54	106.26	105.08	102.74	95.00	80.60	71.42	105.26
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ABSOLUTE MINIMUM (DEGREES FAHRENHEIT).

21.74	20.84	20.12	36.14	43.16	55.94	61.16	57.20	47.66	38.48	34.52	26.96	26.96
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MEAN PRECIPITATION (INCHES).

2.07	1.49	1.44	0.75	0.96	0.42	0.29	0.42	0.61	2.09	2.77	2.73	16.06
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¹ 14 was recorded in 1850, month not stated.

The data recorded are the means of the 23-year period 1859-1882, and in their appropriate places the extremes of temperature recorded in that period. Individual monthly values not obtainable.

*Temperature and precipitation in fig districts—Continued.***ALGER (L'EMPEREUR), AFRICA.¹**

[Latitude 36° 47' N.; longitude 3° 4' E.; elevation 232.2 m.]

MEAN TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885	9.2	-----	12.8	12.8	17.9	19.6	23.0	26.0	23.3	17.1	12.6	12.3	16.77
1886	9.9	10.5	13.4	14.9	17.9	19.4	22.8	22.6	22.5	18.7	13.9	11.8	16.48
1887	9.7	9.8	12.7	13.8	17.2	21.5	24.6	24.7	22.9	15.3	14.6	10.7	16.46
1888	10.3	8.8	12.2	15.2	17.1	21.0	22.8	22.0	-----	18.4	14.8	13.2	16.44
1889	11.0	12.1	13.0	15.2	18.3	21.2	24.5	24.3	22.7	17.6	15.6	11.4	17.24

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).

1885	19.0	-----	28.0	25.0	27.6	29.8	35.0	37.0	37.6	27.0	23.6	22.8	37.6
1886	20.0	18.6	23.0	26.2	33.8	31.7	41.2	36.8	32.2	33.0	24.2	23.2	41.2
1887	18.8	17.8	25.6	31.8	31.0	36.6	42.0	36.4	34.0	30.2	27.5	18.2	42.0
1888	19.2	20.0	28.0	32.6	32.4	36.6	36.0	-----	37.2	32.2	23.8	-----	-----
1889	19.2	22.0	26.5	29.0	29.5	30.0	37.8	34.5	32.5	32.0	24.7	19.2	37.8

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).

1885	2.8	-----	3.2	6.0	9.6	13.8	16.2	18.8	14.0	7.6	6.8	6.8	2.8
1886	4.6	2.2	-----	6.4	10.4	13.8	17.7	16.8	14.4	10.4	7.8	-----	-----
1887	2.0	2.4	7.6	6.8	12.0	13.8	17.0	18.8	14.8	5.0	-----	1.6	1.6
1888	4.4	0.6	-----	-----	11.6	-----	13.8	13.2	10.4	8.6	-----	-----	-----
1889	2.5	2.0	6.5	8.6	11.4	14.2	18.5	18.3	15.8	12.0	4.8	6.4	2.0

MEAN RELATIVE HUMIDITY (PER CENT).

1885	81	-----	75	78	73	78	78	70	69	71	81	76	-----
1886	75	78	78	75	71	74	75	78	75	77	76	73	75.4
1887	74	81	80	75	71	75	70	74	73	74	73	84	75.3
1888	83	77	74	76	80	78	73	74	-----	67	74	80	70.0
1889	70	62	61	61	66	61	64	72	73	63	69	67	65.8

PRECIPITATION (MILLIMETERS).

1885	101.0	18.0	127.5	179.0	7.0	10.9	4.3	0.2	22.8	90.5	127.9	44.2	733.3
1886	230.5	180.5	93.9	95.7	48.0	0.0	1.7	0.0	29.1	336.1	126.3	241.5	1,453.6
1887	113.9	164.6	101.5	87.6	8.9	26.4	2.1	0.0	75.5	68.8	153.1	176.1	978.5
1888	116.1	145.9	87.9	54.6	59.0	14.1	0.4	6.6	-----	91.6	149.7	-----	-----
1889	207.3	81.5	145.0	85.1	92.2	3.0	1.6	1.2	14.5	75.5	112.1	150.9	978.9

PALERMO, SICILY.²

[Latitude 38° 7' N.; longitude 13° 21' E.; elevation 71.3 m.]

MEAN TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881	14.4	11.7	14.6	17.0	17.2	20.6	25.8	26.4	23.8	19.5	14.4	12.6	18.2
1882	10.6	10.0	13.6	14.5	18.5	22.2	23.9	24.3	22.7	20.2	15.3	13.1	17.4
1883	10.6	11.1	11.3	13.5	17.5	20.8	23.7	23.6	21.6	17.8	15.0	10.6	16.4
1884	10.1	11.2	11.9	15.5	18.3	19.5	23.7	24.2	21.9	18.0	13.6	11.4	16.6
1885	8.8	11.9	13.4	14.4	17.6	21.5	24.5	27.8	23.4	19.2	15.2	10.9	17.4

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).

1881	23.8	19.0	27.7	31.0	26.3	33.4	41.3	39.0	32.7	30.6	25.9	20.7	41.3
1882	20.9	20.4	23.8	24.6	34.5	35.8	38.1	33.8	35.6	31.2	25.9	23.8	38.1
1883	23.8	19.7	27.0	32.6	32.5	31.4	41.2	33.9	34.5	28.8	25.4	19.7	34.5
1884	18.9	22.6	21.7	29.6	29.0	30.0	36.2	35.4	37.4	28.9	22.8	19.8	37.4
1885	17.4	28.0	31.8	23.3	32.4	33.0	33.3	45.5	36.7	32.8	24.9	23.2	45.5

¹ Authority: Annales du Bureau Central Météorologique de France, Vol. II, Observations.² Authority: Annali dell'Ufficio Centrale Meteorologico Italiano, vols. 3, 4, 5, 6, 7.

Temperature and precipitation in fig districts—Continued.

PALERMO, SICILY—Continued.

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	5.5	3.0	3.4	7.8	6.4	11.0	16.0	17.2	14.0	8.2	5.4	4.2	8.0
1882.....	2.7	-0.2	4.5	5.2	6.8	12.0	15.4	14.8	11.7	10.7	4.5	4.4	-0.2
1883.....	-0.9	3.1	-0.4	4.4	6.2	11.0	12.3	13.0	10.3	8.8	6.3	2.1	-0.9
1884.....	2.1	0.8	3.4	5.2	7.0	9.8	12.9	15.2	12.6	9.7	4.3	3.7	0.8
1885.....	0.3	0.8	1.8	4.3	5.7	10.8	13.9	17.7	13.9	8.7	7.2	-0.5	-0.5

MEAN RELATIVE HUMIDITY (PER CENT.).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	61	65	59	59	63	62	52	52	58	63	70	74	61
1882.....	79	73	73	73	72	70	65	68	70	75	73	72	72
1883.....	77	74	70	75	67	71	70	69	77	78	79	78	74
1884.....	76	78	78	69	74	68	61	59	65	69	74	76	71
1885.....	74	69	64	68	63	62	64	58	63	68	77	77	67

PRECIPITATION (MILLIMETERS).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	63.9	133.0	41.9	75.0	26.6	51.0	0.0	0.0	27.3	57.1	176.2	121.8	773.8
1882.....	26.7	39.4	122.9	64.2	7.9	16.1	0.8	0.7	32.0	87.7	50.0	67.7	516.1
1883.....	143.3	45.9	179.5	77.1	17.5	3.7	1.4	33.8	115.8	85.1	64.1	138.4	955.6
1884.....	34.3	20.4	43.3	73.6	57.9	38.9	24.0	0.7	9.7	87.6	118.2	79.8	588.4
1885.....	131.9	63.1	34.8	76.5	5.0	0.5	4.6	5.7	39.2	127.7	117.3	103.1	709.4

VALENCIA, SPAIN.¹

[Latitude 39° 28' N.; longitude 0° 22' W.]

MEAN TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	6.6	13.6	11.7	13.0	17.4	19.4	22.9	24.3	20.6	16.0	14.3	10.6	15.9
1886.....	8.9	9.3	13.7	13.5	15.9	18.3	21.0	21.6	18.6	18.1	12.3	11.1	15.2
1887.....	8.8	7.1	13.5	11.8	15.2	20.2	22.8	25.2	22.6	15.9	13.9	10.2	15.6
1888.....	10.0	7.8	11.7	14.5	18.5	22.0	23.7	23.6	20.8	17.7	14.0	10.9	16.2
1889.....	8.5	10.6	11.4	14.0	17.3	21.2	24.1	24.7	24.1	18.6	14.7	8.1	16.4

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	18.0	25.5	26.5	27.0	32.0	30.5	33.0	37.0	32.0	27.0	22.0	20.0	37.0
1886.....	19.0	19.0	25.5	24.5	32.0	30.0	37.0	30.0	35.0	31.0	23.0	24.0	37.0
1887.....	21.5	18.0	26.0	25.5	27.0	33.0	32.0	38.0	33.0	26.5	25.0	27.0	38.0
1888.....	21.0	19.0	25.0	31.0	27.0	32.0	33.0	36.0	34.0	34.0	25.0	19.0	36.0
1889.....	19.0	28.0	21.0	24.0	28.0	33.0	34.0	40.0	35.3	30.0	25.6	17.2	40.0

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	-7.0	6.0	2.0	3.0	6.0	11.0	13.0	14.0	9.0	8.0	7.0	2.0	-7.0
1886.....	0.0	0.0	4.0	4.0	5.0	7.0	7.0	13.0	5.0	6.0	2.0	-3.0	-3.0
1887.....	5.0	-6.0	1.0	1.0	5.0	9.0	9.0	14.0	11.0	3.0	4.0	-1.0	-6.0
1888.....	-3.0	-2.0	0.0	5.0	10.0	13.0	15.0	16.0	13.0	8.0	2.0	8.0	-3.0
1889.....	-1.0	-2.0	1.0	4.0	8.0	11.0	15.0	13.0	14.0	9.0	-1.1	-0.8	-2.0

MEAN RELATIVE HUMIDITY (PER CENT.).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	71	67	71	66	62	68	62	64	58	58	65	72	66
1886.....	62	63	71	70	64	64	60	62	64	66	70	66	66
1887.....	69	70	72	69	66	64	64	64	70	65	70	72	68
1888.....	74	69	67	71	66	60	62	60	78	72	70	76	69
1889.....	72	63	60	62	69	63	62	64	68	68	74	69	66

PRECIPITATION (MILLIMETERS).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	65	19	125	90	2	183	2	3	107	29	2	60	687
1886.....	17	5	76	13	21	8	39	8	40	65	106	2	400
1887.....	11	74	41	106	36	17	57	17	133	33	62	89	676
1888.....	25	2	25	81	2	35	2	0	169	63	0	74	478
1889.....	51	20	2	2	32	37	8	1	45	20	80	30	328

¹ Resumen de las Observaciones Meteorológicas de Provincias.

*Temperature and precipitation in fig districts—Continued.***MALAGA, SPAIN.**

[Latitude 36° 43' N.; longitude 4° 28' W.]

MEAN TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	11.1	15.2	14.7	15.5	21.3	23.1	25.1	26.7	23.5	18.5	15.9	13.4	18.7
1886.....	10.8	13.5	17.3	17.1	20.2	23.7	26.2	26.4	24.9	19.6	14.6	13.5	18.9
1887.....	11.9	11.2	14.5	15.0	18.3	22.7	25.2	25.8	22.6	17.3	15.4	12.4	17.7
1888.....	12.1	11.1	13.6	15.2	18.8	22.8	24.3	23.8	22.3	19.5	15.7	13.9	17.7
1889.....	11.0	13.1	13.1	15.4	18.2	20.5	25.5	25.8	23.0	18.3	16.2	11.6	17.6

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	18.4	23.6	22.8	26.0	32.1	33.1	33.2	37.2	33.7	29.6	25.8	23.4	37.2
1886.....	18.8	22.8	30.2	28.0	31.9	36.0	39.0	38.0	34.8	32.0	25.9	22.1	39.0
1887.....	20.2	20.1	28.4	24.4	28.9	35.8	35.7	35.0	28.8	25.1	23.5	18.1	36.8
1888.....	19.5	20.1	23.1	23.9	26.9	35.2	35.9	37.5	30.0	29.1	21.1	19.8	37.5
1889.....	18.2	26.4	24.9	25.0	28.4	26.5	36.2	36.0	29.9	28.0	21.1	17.8	36.2

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	0.0	8.2	7.3	6.7	11.3	16.1	15.0	16.4	13.2	8.4	6.8	6.1	0.0
1886.....	2.9	3.3	8.8	8.5	12.0	14.9	17.1	19.4	16.1	10.8	8.0	5.0	2.9
1887.....	4.2	3.9	5.5	6.9	11.9	16.4	20.4	20.9	14.5	8.7	7.6	2.5	2.5
1888.....	2.8	3.0	5.8	9.3	13.4	16.0	18.2	19.0	16.6	13.0	8.9	7.7	2.8
1889.....	3.4	4.9	5.4	8.5	11.9	13.6	19.4	20.0	16.9	11.0	5.1	5.4	3.4

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	70	74	66	62	56	60	60	62	64	65	72	81	66
1886.....	67	66	66	66	56	54	60	66	66	73	72	68	65
1887.....	68	65	72	66	67	58	63	66	64	64	74	74	67
1888.....	76	62	70	70	66	59	60	60	72	71	74	82	68
1889.....	74	68	71	68	71	66	61	63	71	67	68	70	68

PRECIPITATION (MILLIMETERS).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	44	66	141	61	0	61	0	25	14	20	91	249	775
1886.....	88	22	19	77	2	0	6	1	5	42	112	24	398
1887.....	33	3	64	92	41	0	0	8	67	8	154	175	605
1888.....	67	21	80	163	4	0	3	0	31	26	115	119	629
1889.....	109	40	77	48	34	42	0	0	79	102	0	64	596

SEVILLA, SPAIN.¹

[Latitude, 37° 23' N.; longitude, 6° 1' W.; elevation, — feet.]

MEAN TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	10.7	15.9	15.0	15.4	22.2	23.1	25.4	28.1	26.8	20.3	17.3	14.4	19.5
1886.....	12.2	14.1	17.9	17.9	21.7	25.9	30.2	30.4	26.6	20.3	15.8	12.7	20.4
1884 ²	13.0	14.1	15.9	16.0	22.1	25.3	29.4	31.4	25.5	20.4	16.8	11.4	20.1
1888.....	11.5	9.7	13.8	16.1	22.5	25.5	28.1	28.6	25.7	20.3	15.1	12.6	19.1
1889.....	9.9	12.6	13.8	15.9	20.1	22.9	28.5	29.2	26.2	18.5	16.0	9.2	18.6

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	22.6	27.0	29.0	26.0	37.8	37.6	42.0	46.8	44.8	37.0	30.0	26.4	46.8
1886.....	26.0	26.8	28.0	28.8	36.6	42.0	46.8	45.0	43.8	35.8	31.0	23.6	46.8
1884 ²	25.6	28.0	29.8	29.8	36.6	42.0	44.4	47.0	43.0	30.0	20.0	22.0	47.0
1888.....	20.0	21.0	23.4	28.0	37.0	40.0	42.0	42.2	39.0	32.0	25.0	20.6	42.2
1889.....	19.0	23.0	26.0	28.0	33.0	39.6	42.0	43.0	40.4	29.0	26.0	21.0	43.0

¹ Authority: Resumen de las Observaciones Meteorológicas de Provincias.² Data for 1884 used instead of 1887.

Temperature and precipitation in fig districts—Continued.

SEVILLA, SPAIN—Continued.

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	-4.2	5.6	4.4	5.8	8.4	14.4	12.0	15.0	10.2	5.8	4.4	3.4	-4.2
1886.....	0.0	0.0	5.8	4.0	8.6	11.8	16.4	16.6	13.0	7.0	3.8	-0.8	-0.8
1884 ¹	1.0	3.0	4.6	4.0	6.8	12.0	16.0	15.0	13.6	8.0	0.4	-0.8	-0.8
1888.....	-1.0	-1.2	3.0	6.0	10.0	13.2	15.4	15.8	14.6	9.0	5.2	3.0	-1.2
1889.....	-0.2	0.0	3.6	5.4	9.0	9.0	16.0	16.6	14.6	7.4	0.0	-1.4	-1.4

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	83	82	74	78	68	64	56	56	63	77	84	88	70
1886.....	84	84	80	68	55	56	58	47	59	72	76	81	68
1884 ¹	81	84	80	78	56	58	50	56	64	67	75	78	69
1888.....	82	76	81	78	70	66	50	56	66	72	78	84	72
1889.....	84	79	77	76	70	60	50	51	62	74	70	72	68

PRECIPITATION (MILLIMETERS).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885.....	41	180	61	102	0	101	0	42	24	37	186	42	817
1886.....	57	18	31	43	11	0	3	0	26	29	76	113	408
1884 ¹	8	36	31	90	5	14	0	0	23	36	30	63	336
1888.....	84	26	145	147	18	5	0	0	16	67	79	141	728
1889.....	41	62	123	60	77	16	0	1	57	22	5	9	473

¹ Data for 1884 used instead of 1887.COSENZA, ITALY.¹

[Latitude, 39° 19' N.; longitude, 16° 17' E.; elevation, 255 meters.]

MEAN TEMPERATURE (DEGREES CENTIGRADE.)

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	8.9	6.8	10.6	13.7	15.7	20.1	25.9	25.8	20.2	15.1	9.9	8.0	15.1
1882.....	6.1	5.7	11.2	11.4	17.6	22.2	24.3	23.6	20.8	17.0	11.9	8.4	15.0
1883.....	6.2	7.7	8.3	11.9	16.9	22.7	25.4	22.6	19.9	14.5	11.0	5.9	14.4
1884.....	4.7	6.3	9.2	12.7	17.6	17.6	22.6	22.5	18.6	13.8	7.0	7.1	13.3
1885.....	4.7	8.9	11.9	12.6	17.2	20.5	24.9	27.1	21.0	16.3	11.9	6.9	15.3

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE.)

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	18.0	13.8	26.0	24.8	27.0	33.0	36.5	32.0	32.5	23.0	18.0	16.0	36.5
1882.....	14.2	17.0	22.4	24.0	30.2	33.0	37.4	31.0	31.5	27.0	19.8	17.5	37.4
1883.....	14.0	15.0	19.8	21.2	30.0	33.0	37.8	31.0	31.0	24.8	30.4	15.2	37.6
1884.....	13.6	15.4	19.0	23.2	28.0	27.5	36.2	32.0	32.0	25.0	17.0	15.2	36.2
1885.....	12.8	21.7	26.0	22.6	27.0	32.4	35.2	39.4	33.0	27.0	18.8	17.4	39.4

MINIMUM TEMPERATURE (DEGREES CENTIGRADE.)

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	0.2	-1.7	-0.8	3.0	5.0	8.3	15.0	14.2	9.8	5.0	3.2	0.8	-1.7
1882.....	0.0	-1.6	5.0	2.0	8.3	11.8	14.0	12.0	12.0	9.8	3.8	0.8	-1.6
1883.....	-6.0	-0.2	-2.1	3.2	7.0	12.0	14.0	12.6	11.0	6.0	4.2	-1.6	-6.0
1884.....	-1.8	-0.6	3.0	5.0	8.0	10.6	11.0	12.2	9.3	4.0	-1.6	1.0	-1.8
1885.....	-3.8	-1.0	3.0	5.0	8.6	12.4	15.6	18.0	11.0	5.4	4.4	-5.6	-5.6

MEAN RELATIVE HUMIDITY (PER CENT.)

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	72	74	75	74	73	71	64	63	62	68	73	74	70
1882.....	73	72	73	72	76	71	71	71	72	74	73	75	73
1883.....	75	75	73	73	73	71	71	68	67	64	70	73	71
1884.....	76	73	75	76	74	72	70	68	69	70	73	79	73
1885.....	79	76	72	72	71	69	67	63	62	65	72	72	70

PRECIPITATION (MILLIMETERS).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	479.7	174.9	59.1	112.6	104.6	89.3	29.6	40.0	86.8	219.3	91.8	186.5	1,674.2
1882.....	29.1	60.0	51.6	99.8	19.6	6.2	5.1	10.8	105.4	117.3	108.9	364.6	936.4
1883.....	68.8	61.6	156.8	203.4	70.6	6.8	0.4	102.6	82.5	152.8	85.6	190.4	1,182.3
1884.....	58.4	49.2	49.4	122.6	14.0	69.9	21.5	66.0	18.6	109.3	150.1	112.8	841.8
1885.....	223.1	75.3	118.0	152.8	42.6	82.9	13.0	11.0	136.2	210.5	167.2	69.6	1,304.2

¹ Authority: Annali del Ufficio Centrale Meteorologico Italiano, vols. 3, 4, 5, 6, 7.

*Temperature and precipitation in fig districts—Continued.***MARSEILLES, FRANCE.¹**

[Latitude 43° 17'; longitude 5° 22' E.; elevation 75 m.]

MEAN TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1885.....	5.4	10.0	10.2	11.8	15.6	20.0	23.5	22.7	18.0	12.3	10.9	7.4	13.96
1886.....	5.7	6.7	9.0	13.0	16.9	19.1	22.6	21.6	20.2	16.4	10.1	6.5	13.96
1887.....	4.5	6.2	8.9	11.4	15.0	20.7	23.9	22.4	17.8	10.2	9.4	5.8	13.02
1888.....	5.4	4.1	8.1	11.7	17.3	19.8	20.2	19.6	19.1	12.2	11.0	8.9	13.12
1889.....	6.0	5.1	7.6	11.3	16.2	21.0	22.0	20.8	18.0	14.2	9.6	4.7	13.04

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1885.....	14.6	17.6	20.1	23.7	29.8	29.1	35.3	34.8	30.1	24.1	21.2	19.8	35.3
1886.....	14.8	16.1	21.0	24.8	29.0	28.0	33.5	31.4	31.7	27.1	20.9	18.1	33.5
1887.....	16.6	16.8	21.0	24.0	26.5	31.3	34.1	33.7	29.2	21.7	16.8	16.6	34.1
1888.....	15.3	.....	19.5	24.1	27.3	28.9	30.0	31.2	28.5	23.0	20.0	17.3	31.2
1889.....	15.7	18.7	18.6	21.1	28.0	31.2	33.0	30.6	30.9	22.7	20.9	16.0	33.0

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1885.....	-2.1	0.1	-0.7	1.9	6.9	10.1	13.5	11.0	7.4	2.6	1.8	-3.0	-3.0
1886.....	-5.2	-3.2	-1.0	1.6	4.0	10.4	11.0	12.4	8.1	7.6	-1.0	-4.2	-5.2
1887.....	-6.0	-4.2	-2.8	0.0	2.0	10.2	13.2	9.2	5.0	-1.6	0.6	-9.4	-9.4
1888.....	-8.0	-4.8	-4.0	-1.0	6.0	10.8	8.5	8.6	10.0	2.0	0.0	-1.0	-8.0
1889.....	-3.0	-6.0	-3.2	3.0	6.0	13.0	11.8	10.6	7.0	3.5	-2.0	-5.2	-6.0

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1885.....	76	74	69	70	65	68	67	66	70	72	77	70	70.3
1886.....	69	71	70	69	65	61	63	65	77	74	79	73	79.7
1887.....	74	73	70	66	58	60	68	60	72	69	78	66	67.8
1888.....	71	71	66	64	63	68	68	64	76	72	80	79	69.8
1889.....	73	61	64	68	75	67	63	61	65	74	71	71	67.6

PRECIPITATION (MILLIMETERS).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1885.....	61.0	27.9	15.6	122.2	25.5	79.1	1.7	11.6	53.8	143.5	83.6	1.4	621.9
1886.....	89.1	60.0	54.6	26.4	8.7	15.4	5.4	15.9	136.1	183.6	204.3	19.1	818.6
1887.....	66.0	110.1	25.8	61.2	21.9	7.2	62.0	34.6	62.4	69.0	101.2	27.5	648.9
1888.....	9.0	71.5	22.1	24.6	46.0	43.6	32.1	45.1	22.6	5.7	90.3	237.7	650.3
1889.....	51.2	15.7	32.5	73.5	70.0	15.1	20.3	0.0	0.3	133.3	12.2	28.2	450.3

PARIS, FRANCE.¹

[Latitude 48° 48' 28"; longitude 2° 20' E. Greenwich; elevation 49.3 m.]

MEAN TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1885.....	-0.24	7.10	5.15	10.09	11.21	18.07	18.50	16.16	14.10	8.55	6.21	2.18	9.76
1886.....	2.21	1.18	5.27	10.47	14.17	15.18	18.30	17.95	16.82	12.38	6.85	2.96	10.31
1887.....	-0.22	2.16	3.43	8.23	11.38	17.82	19.35	17.30	12.73	6.67	5.03	2.33	8.81
1888.....	0.93	-0.09	8.84	7.47	13.34	16.35	15.70	16.40	14.56	7.59	8.12	3.18	8.96
1889.....	1.07	2.37	4.48	8.59	14.65	18.54	17.84	16.80	13.70	9.51	5.86	0.27	9.47

MAXIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1885.....	13.3	17.7	15.4	25.1	30.4	31.4	30.6	31.5	29.1	16.7	15.4	13.5	31.5
1886.....	10.8	11.0	21.3	26.3	28.6	27.3	33.0	31.4	31.6	25.6	16.5	13.2	33.0
1887.....	9.1	13.0	15.6	20.3	23.4	30.8	33.2	35.3	23.0	15.7	13.0	13.3	31.2
1888.....	8.4	8.5	16.3	19.6	27.0	34.5	26.5	30.5	26.7	20.3	15.5	11.9	34.5
1889.....	10.3	13.5	16.2	20.6	27.0	30.3	30.2	28.2	30.1	17.9	14.9	11.9	31.3

¹ Authority: Annales du Bureau Central Météorologique de France; Vol. II, Observations.

Temperature and precipitation in fig districts—Continued.

PARIS, FRANCE—Continued.

MINIMUM TEMPERATURE (DEGREES CENTIGRADE).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885	-10.9	-1.6	-3.7	0.3	-0.3	5.5	9.0	5.3	0.7	0.0	-2.7	-6.4	-10.9
1886	-8.6	-7.0	-6.5	-0.9	1.3	6.2	5.9	8.0	4.2	4.1	-1.3	-7.3	-8.6
1887	-6.9	-9.7	-7.7	-2.0	2.2	6.9	7.3	5.3	2.1	-4.8	-7.6	-8.8	-9.7
1888	-11.8	-15.0	-8.8	-2.2	1.6	5.0	6.5	7.5	3.9	-3.0	-0.3	-6.0	-15.0
1889	-8.6	-10.5	-6.6	0.0	3.8	8.2	7.6	6.9	1.0	0.8	-3.1	-7.5	-10.5

MEAN RELATIVE HUMIDITY (PER CENT).

1885	90.1	80.9	73.2	69.0	70.1	67.4	67.3	67.7	81.5	84.6	86.5	89.2	77.2
1886	85.8	84.4	72.8	70.2	66.6	79.4	73.1	79.2	81.0	85.4	87.5	87.1	79.4
1887	91.1	81.5	77.6	68.2	77.7	70.8	70.1	68.9	80.0	84.7	86.6	87.9	78.8
1888	88.6	87.1	80.8	73.9	65.1	74.9	80.1	78.3	80.7	83.1	86.2	90.1	80.7
1889	88.5	81.2	75.7	74.0	74.0	74.5	72.2	74.6	76.5	85.9	88.0	90.3	80.0

PRECIPITATION (MILLIMETERS).

1885	23.1	41.9	36.0	35.3	38.5	68.9	14.1	65.9	56.8	105.5	44.0	58.8	588.8
1886	43.1	22.7	55.2	56.1	66.1	93.5	39.6	60.0	48.8	75.9	53.7	65.4	680.1
1887	15.5	3.1	20.3	34.9	75.8	44.2	52.2	89.0	30.2	36.4	47.4	48.2	497.2
1888	26.2	36.3	90.5	53.4	30.1	66.5	81.6	42.7	25.8	34.2	41.6	23.4	542.3
1889	29.3	57.2	28.4	56.2	55.4	46.5	31.5	54.9	25.1	81.6	29.5	36.8	532.4

MELBOURNE, AUSTRALIA.¹

[Latitude 37° 49' 53" S.; longitude 144° 58' 45" E.; elevation 91 feet.]

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1885	64.2	64.3	61.5	57.2	54.6	48.1	48.2	51.9	53.9	58.0	59.9	65.5	.....
1886	68.0	62.7	61.2	59.1	52.7	49.2	47.5	49.8	55.5	54.6	61.9	63.4	.....
1887	69.2	67.9	65.0	59.5	52.5	49.3	49.6	50.4	51.8	56.8	58.8	66.6	.....
1888	64.9	64.9	60.0	58.1	53.6	52.0	48.4	48.6	54.2	56.1	62.7	66.7	.....
1889	67.7	65.9	64.4	60.5	55.6	52.5	47.8	50.1	52.3	58.9	61.8	64.0	.....

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

1885	98.4	101.6	95.2	83.6	75.0	62.1	61.2	77.0	75.0	96.1	90.5	95.1	.....
1886	100.0	104.1	98.1	90.2	76.6	63.3	65.1	68.1	78.9	75.5	95.4	96.8	.....
1887	104.9	99.6	93.0	90.6	66.0	65.0	59.9	72.1	73.1	82.1	89.3	94.5	.....
1888	104.0	97.2	94.0	88.9	78.1	66.9	64.2	67.1	80.1	86.0	102.0	96.4	.....
1889	99.2	96.0	96.0	87.9	78.1	66.0	62.1	68.0	74.5	84.5	93.2	99.8	.....

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

1885	42.0	46.1	42.5	40.0	41.2	30.2	29.9	31.7	40.0	36.5	42.1	47.4	.....
1886	48.3	45.9	43.3	37.6	32.7	33.0	28.1	32.9	36.6	38.6	43.8	46.7	.....
1887	47.9	46.7	42.0	41.3	36.8	33.0	34.9	33.6	36.2	38.1	41.5	46.1	.....
1888	48.8	43.1	42.0	34.8	40.0	36.2	28.3	30.0	34.4	36.1	38.1	47.2	.....
1889	49.7	45.5	43.0	37.2	39.4	37.6	31.3	32.1	32.1	37.8	41.3	47.0	.....

MEAN RELATIVE HUMIDITY (PER CENT).

1885	64	67	66	74	73	81	82	65	75	69	67	69	.....
1886	68	68	68	70	72	78	80	74	65	70	65	68	.....
1887	65	66	66	76	84	87	80	80	74	73	71	67	.....
1888	71	64	71	66	80	76	76	75	75	64	64	66	.....
1889	68	67	63	72	77	77	81	75	69	70	70	61	.....

PRECIPITATION (INCHES).

1885	0.75	2.74	2.39	2.52	1.23	3.63	1.13	1.56	3.96	1.99	3.54	1.53	.....
1886	4.54	1.54	1.72	0.95	0.80	0.81	0.84	2.45	1.30	2.84	2.67	3.54	.....
1887	1.11	2.67	1.78	4.84	1.88	3.04	2.68	0.96	2.71	2.83	3.66	5.13	.....
1888	2.58	0.42	2.10	0.85	3.77	1.19	1.51	0.99	1.23	1.35	0.62	3.72	.....
1889	4.22	1.50	0.24	3.60	0.94	2.78	1.64	2.06	1.51	2.88	4.27	1.62	.....

¹Authority: Monthly record of observations at Melbourne Observatory (Ellery).

*Temperature and precipitation in fig districts—Continued.*UPPER SACRAMENTO VALLEY, CALIFORNIA.¹

[Latitude, 40° 10' N.; longitude, 122° 15' W.; elevation, 342 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	67	79	72	77	91	94	99	107	95	87	79	70	.....
1885.....	67	73	85	84	100	97	107	108	100	93	71	68	.....
1886.....	64	77	75	85	95	103	109	104	106	93	78	65	.....
1887.....	71	69	80	90	110	105	112	107	101	96	80	68	.....
1888.....	60	82	78	93	96	93	100	108	106	92	73	61	.....

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

1884.....	30	32	32	42	50	52	56	55	46	42	36	25	.....
1885.....	33	34	39	34	44	48	57	58	52	46	38	33	.....
1886.....	30	37	35	37	46	56	55	57	52	38	33	37	.....
1887.....	30	28	39	38	40	47	56	55	48	47	27	32	.....
1888.....	18	34	32	41	48	49	54	55	55	44	36	35	.....

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

1884.....	46.2	45.9	51.6	56.8	68.0	69.6	73.4	81.5	67.3	62.1	54.7	47.5	.....
1885.....	47.5	53.5	61.0	62.1	70.4	71.6	80.7	83.8	74.8	65.6	52.7	49.3	.....
1886.....	46.2	54.5	52.8	57.7	66.9	79.1	82.6	81.5	75.6	60.7	51.3	50.0	.....
1887.....	48.7	45.4	58.9	60.2	68.8	77.1	83.9	81.3	76.4	71.1	55.2	48.2	.....
1888.....	40.9	53.9	54.5	67.0	68.1	70.7	81.2	82.4	80.2	67.0	54.0	48.0	.....

MEAN RELATIVE HUMIDITY (PER CENT.).²

1884.....	73	71	73	73	58	59	39	38	46	53	62	66	.....
1885.....	82	69	56	61	45	47	36	30	39	53	87	86	.....
1886.....	83	72	63	67	57	35	32	33	34	53	54	81	.....
1887.....	64	72	68	48	44	34	36	35	32	27	46	67	.....
1888.....	70	58	54	54	51	53	34	31	35	38	63	88	.....

PRECIPITATION (INCHES).

1884.....	3.55	2.21	7.81	4.31	0.18	0.97	0.00	T.	0.36	0.90	0.04	7.73	28.06
1885.....	1.84	1.19	T.	0.62	0.64	1.37	0.06	0.00	2.91	0.10	17.05	3.86	29.63
1886.....	4.85	0.18	1.31	4.12	0.73	T.	T.	T.	0.00	1.76	0.34	3.92	17.21
1887.....	0.57	5.21	1.13	1.76	0.77	0.26	T.	T.	0.08	0.00	1.52	2.32	13.60
1888.....	4.06	2.17	3.47	0.53	0.51	2.61	0.07	0.00	0.33	T.	4.32	6.85	24.94

¹ Maximum and minimum temperatures at stations in the United States are from self-registering maximum and minimum thermometers. The means have been deduced from observations three times daily—7 a. m., 3 and 11 p. m., seventy-fifth meridian time. Precipitation includes rain and melted snow.

² Mean of observations three times daily except from July to December, 1888, inclusive, when but two observations were made each day.

T. = Trace of precipitation.

*Temperature and precipitation in fig districts—Continued.***CENTRAL SAN JOAQUIN VALLEY, CALIFORNIA.**

[Latitude, 36° 43' W.; longitude, 119° 49' W.; elevation, 313 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1888.....	68	83	77	98	96	104	109	111	111	94	78	66	.....
1889.....	63	75	84	93	101	106	112	110	105	98	72	65	.....
1890.....	58	70	77	92	103	104	111	105	103	88	82	70	.....
1891.....	66	68	78	91	85	112	114	112	104	94	81	66	.....
1892.....	69	70	78	80	104	106	110	112	104	94	.....	.....	.....

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1888.....	20	30	28	41	46	50	54	56	54	41	35	35	.....
1889.....	23	27	38	41	44	55	55	54	50	42	36	31	.....
1890.....	24	28	33	36	42	46	56	56	53	42	37	29	.....
1891.....	26	27	32	37	47	50	51	56	51	40	34	27	.....
1892.....	30	34	36	36	41	48	55	55	52	36	.....	.....	.....

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1888.....	44.1	53.2	54.1	67.1	68.6	74.1	81.7	83.0	80.7	66.5	54.3	48.2	.....
1889.....	43.8	50.2	58.4	63.5	69.6	79.5	82.6	82.2	75.6	62.8	54.1	49.1	.....
1890.....	42.2	47.2	54.6	61.2	69.4	73.4	82.5	80.8	74.6	64.5	56.9	43.8	.....
1891.....	45.4	48.5	54.4	59.0	67.1	73.0	83.6	83.6	74.6	67.0	56.2	43.9	.....
1892.....	48.5	53.2	55.6	67.6	67.2	72.8	79.4	81.4	73.6	63.9	.....	.....	.....

MEAN RELATIVE HUMIDITY (PER CENT).

(Observations at 8 a. m. and 8 p. m., seventy-fifth meridian time).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1888.....	81	74	75	57	58	52	45	41	49	59	79	93	.....
1889.....	86	71	72	62	53	43	34	29	35	67	76	86	.....
1890.....	82	73	68	60	55	42	30	38	48	51	55	93	.....
1891.....	79	69	69	62	52	42	30	31	41	46	59	76	.....
1892.....	75	72	69	59	56	40	33	34	44	55	.....	.....	.....

PRECIPITATION (INCHES).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1888.....	1.75	0.13	1.95	0.22	0.56	T.	T.	T.	0.06	0.00	2.38	1.71	8.76
1889.....	0.34	0.32	2.07	0.54	0.57	0.00	0.00	T.	0.00	3.17	1.39	3.87	12.27
1890.....	2.12	0.80	1.04	0.17	0.45	0.00	6.00	T.	1.26	0.00	0.22	2.30	8.36
1891.....	0.88	2.24	0.81	0.49	0.03	0.02	0.00	0.00	0.27	0.00	0.21	3.99	8.94
1892.....	0.48	1.00	1.69	0.79	1.44	0.06	0.00	0.00	T.	0.34	.....	.....	.....

SOUTHERN CALIFORNIA, NORTHERN COAST OF.¹

[Latitude, 34° 58' N.; longitude, 120° 29'; elevation, 20 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1883.....	72	77	72	82	92	92	79	84	96	75	80	70	.....
1884.....	68	77	69	70	77	80	84	84	78	77	69	72	.....
1885.....	65	73	78	76	72	74	82	87	92	84	73	74	.....
1886.....	80	76	68	74	76	77	83	82	77	75	76	76	.....
1887.....	72	68	76	77	80	90	85	74	75	82	74	70	.....

¹Authority, Mr. Hugh D. Vall; observations at 7 a. m., 2.00 p. m., local time.

*Temperature and precipitation in fig districts—Continued.***SOUTHERN CALIFORNIA, NORTHERN COAST OF—Continued.****MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).**

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1883.....	33	31	47	44	50	52	56	55	58	47	41	40	-----
1884.....	41	37	42	48	50	55	58	54	53	49	45	36	-----
1885.....	41	43	48	51	52	58	58	58	59	55	46	45	-----
1886.....	41	40	40	47	52	55	57	51	54	47	40	44	-----
1887.....	42	43	49	48	58	58	55	58	59	56	46	43	-----

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

1887.....	54.7	50.4	57.0	58.4	60.1	63.7	64.6	64.8	66.0	65.0	58.9	52.8	-----
1888.....	49.0	53.8	53.0	59.9	57.6	64.4	67.0	66.3	67.9	63.5	59.1	55.8	-----
1889.....	53.0	55.4	58.0	59.9	60.0	62.5	62.2	67.3	68.8	63.9	59.6	54.2	-----
1890.....	48.4	52.6	55.6	56.6	60.0	62.4	67.3	67.9	66.5	64.0	63.3	58.4	-----
1891.....	54.4	52.6	56.6	56.3	59.0	62.4	67.2	69.1	69.3	63.3	58.8	51.9	-----

PRECIPITATION (INCHES.)

1887.....	0.31	8.64	0.13	1.43	0.33	0.06	0.00	0.00	0.38	0.31	1.10	4.43	17.09
1888.....	10.15	1.30	3.88	0.18	0.02	T.	T.	T.	0.03	0.07	5.62	5.59	28.80
1889.....	0.29	1.29	7.31	0.49	0.76	0.13	0.00	0.00	0.00	8.65	3.21	10.64	32.77
1890.....	5.32	2.96	1.10	0.31	0.18	0.06	0.00	0.00	1.50	0.06	0.48	3.53	15.49
1891.....	0.45	7.92	1.56	1.57	0.30	0.00	0.00	0.00	0.15	0.00	0.00	2.43	14.38

SOUTHERN CALIFORNIA, SOUTHERN COAST OF.

[Latitude, 33° 43' N.; longitude, 117° 10' W.; elevation, 66 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	78	79	68	69	72	81	84	92	78	87	74	68	-----
1885.....	68	76	81	83	73	74	82	89	90	88	76	79	-----
1886.....	74	80	68	71	72	75	81	82	78	75	77	76	-----
1887.....	74	76	82	80	79	78	79	77	79	85	82	74	-----
1888.....	64	67	72	93	70	76	77	82	82	80	75	73	-----

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

1884.....	39	38	43	45	47	50	54	54	51	47	42	36	-----
1885.....	38	40	42	47	52	52	58	62	56	47	42	40	-----
1886.....	36	44	41	45	50	54	57	61	60	47	40	40	-----
1887.....	38	38	44	44	48	54	60	54	58	50	44	36	-----
1888.....	33	42	41	47	52	54	55	57	58	53	46	44	-----

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

1884.....	55.0	55.9	56.5	57.6	61.4	64.4	68.4	69.5	65.1	61.3	58.6	54.4	60.7
1885.....	54.0	55.4	59.6	62.0	63.3	64.3	67.6	71.8	68.0	63.9	59.6	57.1	62.2
1886.....	55.9	58.5	55.0	57.2	60.4	63.1	67.1	70.5	66.6	60.7	56.0	56.0	60.5
1887.....	54.3	52.9	57.2	59.0	62.1	64.6	66.5	66.2	65.7	64.5	58.2	54.6	60.6
1888.....	51.6	54.9	55.8	60.8	61.2	66.0	68.4	69.2	69.7	65.0	59.9	58.2	61.7

MEAN RELATIVE HUMIDITY (PER CENT).

1884.....	63	72	76	80	80	78	78	78	75	77	77	78	-----
1885.....	76	78	73	76	77	75	76	76	81	85	82	74	-----
1886.....	74	71	77	76	79	81	78	79	84	82	70	82	-----
1887.....	70	75	79	76	74	80	81	80	84	72	77	71	-----
1888.....	76	77	81	80	77	83	82	84	89	91	86	86	-----

PRECIPITATION (INCHES).

1884.....	1.34	9.05	6.23	2.84	2.17	0.31	0.00	T.	0.07	0.35	0.11	5.12	27.59
1885.....	0.35	0.02	0.78	1.20	0.61	0.06	T.	0.13	T.	0.31	1.56	0.71	5.73
1886.....	6.95	1.51	3.73	1.95	0.04	0.07	T.	T.	0.00	0.05	0.95	0.10	15.35
1887.....	0.04	4.51	0.02	2.14	0.47	0.04	0.01	T.	T.	T.	2.08	1.14	10.45
1888.....	1.96	1.48	2.79	0.19	0.22	0.04	0.01	T.	0.04	0.26	1.83	2.84	11.57

*Temperature and precipitation in fig districts—Continued.***YUMA, ARIZ.**

[Latitude 32° 45'; longitude 114° 36' W.; elevation 141 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	72	84	81	95	104	113	112	112	104	100	87	78	-----
1885.....	78	84	87	96	110	104	110	114	107	106	86	78	-----
1886.....	80	83	88	93	108	110	112	112	104	93	81	79	-----
1887.....	76	83	92	97	104	116	114	112	105	108	91	72	-----
1888.....	79	85	87	102	102	107	114	110	111	105	82	75	-----

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	37	34	43	45	49	58	68	68	56	50	43	36	-----
1885.....	36	38	43	51	57	69	67	70	62	51	41	40	-----
1886.....	30	44	38	45	54	64	69	75	62	47	32	34	-----
1887.....	30	35	43	44	44	59	66	60	62	43	36	27	-----
1888.....	27	39	37	47	54	60	63	70	67	49	38	40	-----

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	54.6	57.3	60.9	67.4	78.3	81.7	90.6	88.9	80.0	71.7	63.3	53.0	70.4
1885.....	52.6	59.8	67.2	70.7	78.2	81.2	89.1	90.5	84.7	74.7	63.3	57.5	72.5
1886.....	55.0	62.7	60.5	67.4	80.1	84.0	90.8	89.6	84.2	67.4	57.8	50.3	71.6
1887.....	55.6	56.1	69.9	69.8	77.2	85.9	92.0	90.9	84.7	75.8	63.9	53.1	72.9
1888.....	51.6	60.5	62.5	75.3	76.9	85.6	91.4	91.0	89.2	74.9	61.9	57.0	73.2

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	41	55	50	45	41	42	43	49	46	54	60	72	-----
1885.....	57	55	55	53	49	50	60	65	65	61	68	57	-----
1886.....	62	45	50	49	42	50	47	62	49	53	43	48	-----
1887.....	47	57	60	64	59	43	45	49	56	48	57	56	-----
1888.....	56	55	48	37	38	30	41	43	48	56	66	68	-----

PRECIPITATION (INCHES).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	T.	1.58	1.48	0.07	0.44	T.	0.01	0.32	T.	T.	T.	1.96	5.86
1885.....	T.	0.02	T.	0.07	T.	0.00	0.05	0.86	0.00	0.00	1.71	0.01	2.72
1886.....	1.06	0.08	0.53	0.31	0.00	0.00	T.	2.23	0.00	1.11	0.23	0.00	5.35
1887.....	0.00	T.	0.00	0.20	T.	0.01	T.	T.	1.09	0.02	2.43	0.15	8.90
1888.....	0.18	0.05	0.05	T.	0.00	0.00	0.04	T.	0.01	0.99	0.68	0.95	2.95

PHOENIX, ARIZ.

[Latitude 33° 28' N.; longitude 112° 0' W.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1881.....	73	84	91	97	99	104	106	104	97	93	77	77	-----
1882.....	74	72	90	105	102	109	114	114	108	99	82	95	-----
1883.....	87	80	92	96	107	119	112	116	114	96	80	87	-----
1884.....	79	86	79	96	104	114	115	115	105	100	97	83	-----
1885.....	82	86	91	99	113	110	113	115	113	105	96	89	-----

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1881.....	22	25	28	42	47	52	65	59	48	34	26	25	-----
1882.....	19	23	32	36	50	54	69	65	45	41	24	24	-----
1883.....	13	23	38	30	41	55	65	68	51	34	26	20	-----
1884.....	20	19	30	33	36	48	58	52	39	42	34	25	-----
1885.....	22	22	28	30	35	33	46	49	44	40	31	30	-----

Temperature and precipitation in fig districts—Continued.

PHOENIX, ARIZ.—Continued.

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	45.5	55.4	58.4	69.3	75.6	82.9	87.7	85.1	77.1	66.5	51.7	51.5	-----
1882.....	44.1	51.0	62.0	67.1	77.2	83.6	91.6	88.6	81.7	69.8	59.7	57.9	-----
1883.....	47.0	52.1	64.5	62.1	71.3	85.4	89.0	88.0	81.3	67.2	58.5	55.5	-----
1884.....	50.6	52.5	54.5	63.0	71.2	79.6	87.7	83.7	73.6	72.1	61.6	51.9	-----
1885.....	50.2	54.8	56.9	65.0	68.9	71.6	82.3	83.1	79.3	70.6	56.3	53.5	-----

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1878.....	43	44	49	51	37	32	37	54	39	31	46	45	-----
1879.....	-----	-----	-----	-----	-----	-----	40	37	33	50	43	65	-----
1880.....	62	55	54	45	34	32	42	42	38	39	43	65	-----
1881.....	52	47	50	41	36	39	44	55	48	41	42	46	-----

PRECIPITATION (INCHES).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881.....	0.00	0.20	1.46	1.10	0.12	0.00	2.03	2.19	1.04	0.25	0.36	0.16	6.91
1882.....	1.62	0.17	0.00	0.00	0.00	0.37	0.32	1.81	1.25	0.10	1.30	0.00	6.94
1883.....	0.83	1.27	1.16	T.	0.44	0.00	0.07	0.07	0.00	0.20	0.00	3.36	7.40
1884.....	0.16	2.46	2.14	0.40	0.01	0.15	0.07	1.84	1.50	1.12	0.24	2.74	12.83
1885.....	0.00	0.47	0.33	0.00	0.65	0.04	0.18	0.71	0.07	0.09	0.91	0.32	3.77

NEW ORLEANS, LA.

[Latitude 29° 58'; longitude 90° 4' W.; elevation 52 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	72	77	80	82	86	91	95	93	92	90	76	76	-----
1885.....	75	75	77	83	87	92	92	93	92	80	85	74	-----
1886.....	72	74	81	86	91	92	93	95	92	87	82	72	-----
1887.....	78	82	81	87	91	91	96	94	94	86	80	77	-----
1888.....	80	79	78	85	88	92	96	94	91	87	85	72	-----

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	22	33	41	50	62	68	71	66	70	49	42	29	-----
1885.....	28	30	36	52	60	72	74	70	66	49	40	30	-----
1886.....	15	25	40	41	57	70	71	68	62	45	34	27	-----
1887.....	21	44	44	48	62	66	70	71	60	42	34	29	-----
1888.....	29	35	41	56	60	66	72	70	56	55	41	31	-----

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	47.1	60.7	64.8	68.2	76.4	79.4	85.4	82.3	80.9	74.4	59.7	58.7	69.8
1885.....	52.1	53.1	58.4	70.5	73.9	82.2	82.9	80.4	77.1	65.7	59.7	53.1	67.4
1886.....	45.5	53.2	58.6	65.6	72.6	78.7	79.8	81.4	77.8	69.5	59.1	51.6	66.1
1887.....	51.4	65.2	62.1	67.9	75.2	78.3	80.5	81.0	77.3	68.1	61.1	52.9	68.4
1888.....	55.6	58.6	60.3	69.9	72.8	77.3	83.6	81.0	77.6	70.8	61.8	53.8	68.6

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	71	70	72	69	72	72	70	69	74	72	67	77	-----
1885.....	72	66	68	75	73	72	74	84	86	74	75	78	-----
1886.....	80	68	76	76	74	82	80	77	81	72	74	74	-----
1887.....	74	81	70	71	74	79	81	80	77	74	74	81	-----
1888.....	80	80	72	77	77	79	77	87	79	79	79	79	-----

PRECIPITATION (INCHES).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	4.35	3.16	8.24	6.48	4.33	8.60	4.12	0.87	3.12	5.60	3.18	8.01	60.01
1885.....	9.70	2.39	6.99	3.67	5.77	3.30	6.15	4.25	13.55	0.56	3.47	4.38	64.18
1886.....	7.53	1.96	8.41	5.60	3.07	9.30	4.35	2.40	4.09	0.22	5.33	2.57	54.83
1887.....	4.26	5.53	3.37	1.87	3.99	11.33	7.85	7.42	6.51	4.71	0.52	7.56	64.97
1888.....	3.20	11.21	6.45	1.89	9.75	9.09	2.02	22.74	4.15	7.36	1.50	3.68	83.13

*Temperature and precipitation in fig districts—Continued.***JACKSONVILLE, FLA.**

[Latitude, 30° 20' N.; longitude, 81° 33' W.; elevation, 43 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	72	79	85	88	91	92	96	94	89	92	79	75	-----
1885.....	78	73	79	88	89	96	95	94	92	85	81	76	-----
1886.....	73	73	84	86	92	94	94	94	92	87	83	76	-----
1887.....	76	84	80	89	91	95	100	97	95	88	78	76	-----
1888.....	81	82	84	88	93	96	98	96	92	86	83	74	-----

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT)).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	21	37	42	47	52	62	69	70	64	49	39	33	-----
1885.....	32	32	38	47	56	68	71	70	68	49	36	32	-----
1886.....	15	24	37	44	56	67	70	65	66	44	36	27	-----
1887.....	22	38	36	38	55	64	69	68	55	40	26	31	-----
1888.....	28	32	35	49	56	64	68	67	55	50	38	28	-----

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	51.7	62.1	66.3	68.7	76.5	76.9	82.9	79.8	77.8	72.8	61.7	58.4	69.6
1885.....	56.2	54.5	57.6	67.8	73.7	80.1	82.4	80.7	78.3	67.6	60.3	53.3	67.7
1886.....	50.7	53.5	59.9	66.5	75.8	80.7	80.9	80.4	78.6	68.9	59.1	52.8	67.3
1887.....	49.8	64.4	59.5	67.0	73.6	77.9	81.8	80.8	76.1	70.1	60.9	55.6	68.1
1888.....	57.2	60.2	60.3	70.1	74.2	79.2	81.9	82.5	77.0	69.9	61.6	53.6	69.0

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	77	75	73	66	73	79	76	80	82	78	80	86	-----
1885.....	79	73	74	74	77	81	75	79	85	77	75	74	-----
1886.....	79	78	78	74	69	77	80	82	82	80	76	83	-----
1887.....	83	84	74	73	74	76	76	79	80	80	79	85	-----
1888.....	79	82	73	73	74	72	75	79	85	83	84	83	-----

PRECIPITATION (INCHES).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	4.78	2.45	2.63	2.32	5.45	6.89	6.02	5.21	5.68	4.12	5.43	4.04	55.02
1885.....	7.18	5.23	5.06	1.24	7.74	8.08	7.16	7.56	10.63	3.36	0.50	7.76	82.00
1886.....	2.81	1.87	6.74	3.08	2.81	4.78	14.97	6.25	4.91	2.47	0.97	8.20	54.86
1887.....	4.34	0.34	3.51	4.15	7.15	9.68	8.90	5.78	9.40	1.57	0.10	3.70	53.40
1888.....	0.49	4.38	1.57	0.93	5.46	2.92	8.30	4.89	11.15	6.00	4.16	2.88	53.13

GALVESTON, TEX.

[Latitude, 29° 18' N.; longitude, 94° 47' W.; elevation, 40 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	70	75	77	81	84	91	95	93	90	87	75	72	-----
1885.....	73	70	74	84	88	92	94	92	91	82	80	73	-----
1886.....	69	71	71	80	87	90	92	94	89	83	85	72	-----
1887.....	75	75	81	87	88	88	83	91	88	84	76	74	-----
1888.....	68	72	75	78	86	90	91	94	87	85	82	71	-----

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1884.....	22	28	41	48	60	66	76	71	74	57	44	29	-----
1885.....	23	28	43	60	58	73	75	72	68	49	46	34	-----
1886.....	11	32	38	43	60	67	68	71	61	50	34	25	-----
1887.....	24	47	46	51	57	68	67	71	57	48	37	39	-----
1888.....	23	40	42	56	62	69	74	71	65	54	42	40	-----

Temperature and precipitation in fig districts—Continued.

GALVESTON, TEX.—Continued.

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	46.7	60.4	64.8	67.2	75.9	81.4	85.2	83.8	83.5	74.8	61.9	57.6	.....
1885.....	50.6	52.6	60.7	71.9	76.2	84.1	84.9	84.2	79.9	69.7	64.9	57.6	.....
1886.....	47.3	53.5	59.0	66.5	74.6	80.3	82.8	83.2	80.1	71.6	62.0	56.2	.....
1887.....	51.2	62.9	65.2	69.4	75.9	79.9	82.9	83.1	79.7	69.4	64.0	53.3	.....
1888.....	49.8	58.8	60.1	71.2	74.8	80.2	83.0	82.6	78.2	73.1	61.6	57.4	.....

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	78	79	78	78	78	74	76	73	74	75	76	84	.....
1885.....	82	80	79	83	76	71	73	75	82	71	76	78	.....
1886.....	86	78	80	81	78	80	75	76	79	73	75	81	.....
1887.....	78	84	75	76	78	76	74	74	73	72	71	82	.....
1888.....	89	82	78	86	78	79	76	78	77	79	85	73	.....

PRECIPITATION (INCHES).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	5.11	0.89	4.84	5.85	8.42	6.84	1.16	1.77	7.04	7.37	4.25	9.44	62.68
1885.....	6.97	2.04	3.17	4.12	6.41	3.28	2.20	1.74	26.01	2.20	2.32	2.10	62.56
1886.....	3.45	2.31	3.19	2.15	0.08	6.19	1.20	2.46	13.31	1.98	2.65	2.10	40.97
1887.....	1.19	1.86	1.98	0.01	4.84	8.28	1.62	6.43	2.52	4.37	0.05	10.28	43.43
1888.....	2.70	7.54	2.84	3.13	5.18	9.77	1.54	14.46	3.32	5.67	6.73	3.00	65.88

ATLANTA, GA.

[Latitude, 33° 45' N.; longitude, 84° 23' W.; elevation, 1,129 feet.]

MAXIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	64	73	76	82	85	89	90	89	88	91	70	66	.....
1885.....	64	69	70	83	83	90	91	90	87	74	73	69	.....
1886.....	60	65	73	82	90	90	92	94	90	84	75	65	.....
1887.....	69	74	75	88	89	97	100	91	95	82	72	65	.....
1888.....	71	68	77	84	88	93	94	96	87	79	77	63	.....

MINIMUM TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	-1	11	24	35	55	57	65	60	52	34	30	11	.....
1885.....	14	8	20	36	48	57	59	59	53	37	29	21	.....
1886.....	-2	8	27	32	44	60	58	62	53	34	28	15	.....
1887.....	9	29	25	36	57	57	59	55	45	30	16	15	.....
1888.....	15	13	24	40	44	55	65	62	43	40	28	21	.....

MEAN TEMPERATURE (DEGREES FAHRENHEIT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	35.7	51.0	54.2	58.1	70.9	70.8	78.0	75.1	74.9	67.8	51.6	45.1	.....
1885.....	39.9	39.5	47.0	61.1	66.1	76.4	78.2	76.5	69.5	56.5	50.2	42.7	.....
1886.....	36.1	41.9	50.1	60.4	68.1	72.3	75.8	76.1	72.9	62.3	50.6	40.7	.....
1887.....	39.6	52.7	50.7	62.7	72.0	75.9	77.6	76.2	72.1	59.6	52.5	42.3	.....
1888.....	45.0	49.0	50.6	64.1	68.6	74.8	79.2	78.5	68.8	58.2	52.4	43.5	.....

MEAN RELATIVE HUMIDITY (PER CENT).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	71	63	66	59	59	75	71	71	61	63	57	73	.....
1885.....	66	62	56	55	69	71	74	75	81	76	70	61	.....
1886.....	74	58	64	65	66	80	76	79	75	61	62	75	.....
1887.....	73	86	77	60	65	63	77	73	62	65	60	73	.....
1888.....	74	76	63	53	69	70	74	75	82	77	76	70	.....

PRECIPITATION (INCHES).

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1884.....	5.20	5.84	9.70	5.86	1.33	10.73	2.42	2.06	0.06	0.70	2.84	6.09	.....
1885.....	8.44	4.14	4.26	1.31	6.12	4.83	4.02	6.82	6.51	3.94	3.96	2.64	.....
1886.....	7.53	1.53	11.16	2.52	6.21	6.68	2.08	2.36	0.53	0.03	5.82	3.03	.....
1887.....	3.52	3.74	1.99	1.36	1.76	2.82	14.11	7.51	4.20	3.28	0.30	5.79	
1888.....	3.89	5.91	8.16	1.34	6.86	4.71	1.85	3.89	14.26	3.99	4.70	5.42	

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BULLETIN No. 10.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,

G. B. BRACKETT, *Pomologist.*

PRUNES AND PRUNE CULTURE IN WESTERN EUROPE,

WITH SPECIAL REFERENCE TO EXISTING CONDITIONS
IN THE PACIFIC NORTHWEST.

BY

EDWARD R. LAKE,

Professor of Botany and Horticulture, Oregon State Agricultural College.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

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LETTER OF TRANSMITTAL

DEPARTMENT OF AGRICULTURE,
DIVISION OF POMOLOGY,
Washington, D. C., June 19, 1901.

SIR: I have the honor to transmit herewith and to recommend for publication as a bulletin of this Division the manuscript of a report upon "Prunes and Prune Culture in Western Europe With Special Reference to Existing Conditions in the Pacific Northwest," by Prof. Edward R. Lake, of the Oregon Experiment Station. It also contains important references to the Mirabelle group of plums and their economic value in the countries visited.

The expenses of the investigation of which this manuscript is the official report were defrayed from the appropriation of the Division of Botany for Botanical Investigations. Credit is therefore due to Mr. Frederick V. Coville, Botanist of this Department, for his kind cooperation and valuable assistance in aiding this Division in carrying out the investigation made by Professor Lake.

This bulletin contains the report of a careful investigation of the economics of the prune industry in western Europe, more especially in France and Germany.

Very respectfully,

G. B. BRACKETT,
Pomologist.

HON. JAMES WILSON, *Secretary.*

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PRUNES AND PRUNE CULTURE IN WESTERN EUROPE, WITH SPECIAL REFERENCE TO EXISTING CONDITIONS IN THE PACIFIC NORTHWEST.

INTRODUCTION.

The prune industry of the Pacific Northwest, including the States of Oregon, Washington, and Idaho, is to-day the foremost pomological interest of this section. Beginning with a few trees planted by the late Henry Miller, at Milwaukee, Oreg., in 1860, and a commercial orchard planted near Portland, Oreg., by Dr. J. R. Cardwell, in 1871,¹ the plantings have increased until at present there are approximately 50,000 acres of commercial prune orchards in these three States. The estimated value of this acreage, together with equipment, including apparatus, evaporating and packing plants, is \$20,000,000.² Of this acreage at least 20 per cent is of the variety known as Agen ("*California*," "*Petite*," or "*French*"), and the remainder, or 80 per cent, is of the variety known as the Italian prune (*Fellenberg*), and it is with especial reference to this latter variety that this report has to deal. There are various other varieties grown in small quantities in an experimental way in this section, but as yet only the two above mentioned, together with a so-called "*Silver*" prune (Golden Drop, *Coe*), are of commercial importance. This latter variety is rapidly passing out of commerce; in fact, the trade journals in 1900, almost to a unit, did not give quotations on this fruit. The authority quoted above has estimated that a light crop of prunes for the Pacific Northwest for the year 1901 would yield approximately 40,000,000 pounds of the evaporated product, while a full crop would be not less than three times that amount. On the basis of the prices received for the crop of 1900, the fruit of the Agen being included in the estimates, an average crop of the prune orchards of this region ought to yield not far from \$2,500,000 per year, on a basis of the present acreage. It is quite probable that the income would be much larger if all of the crop, taking one year with another, could be saved and the product put upon the market in a uniformly high-grade style. With the rapid increase in bearing acreage since 1894-95 there has been a decided decline in

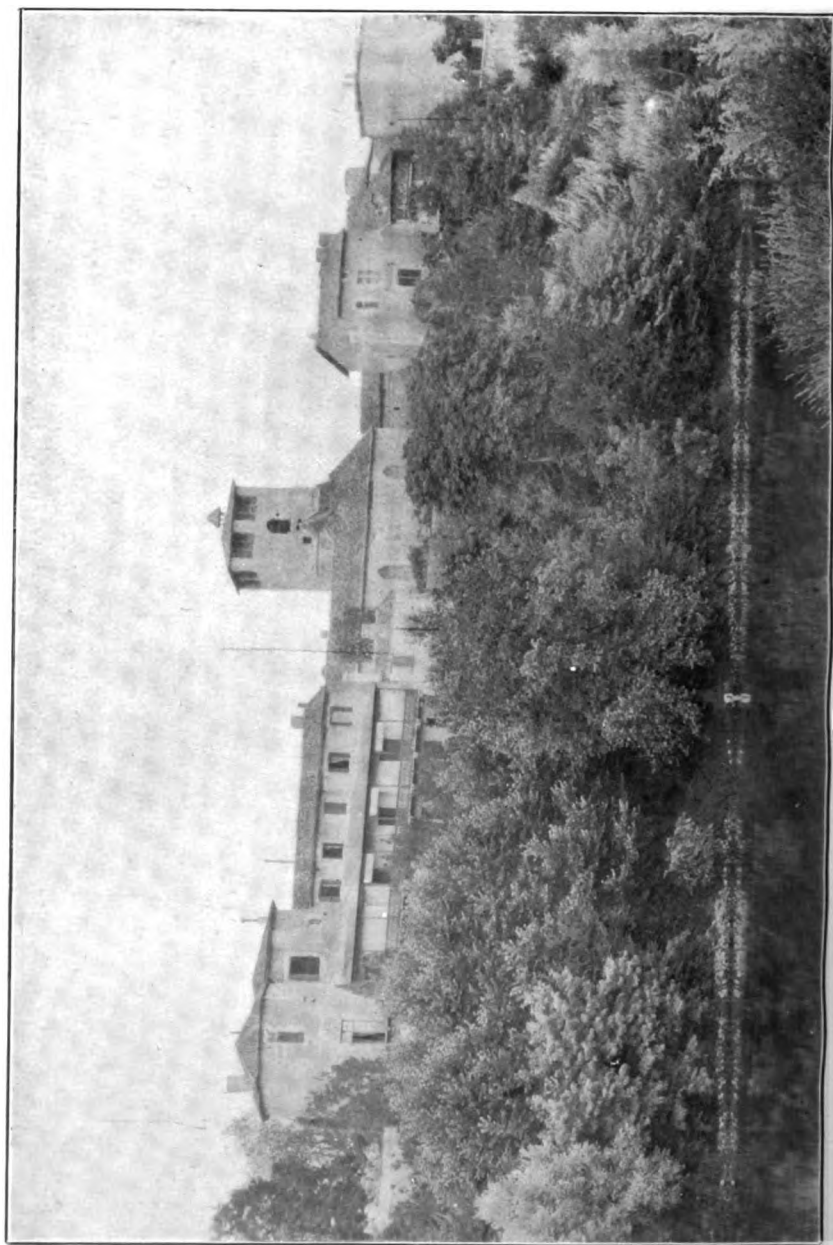
¹ Grafting wood of both the Italian and Agen was obtained by the nursery firm of Miller & Lambert from Ellwanger & Barry, and to this firm (Miller & Lambert) is due the credit of having introduced the prune into this region.

² These figures are based upon extensive and careful inquiries first made in 1893, and supplemented by further investigations made in recent years by H. M. Williamson, a conservative authority.

the average market price of the product. No longer do the growers receive the large prices—8 to 12 cents per pound—that were received in the decade from 1880 to 1890; still, the present prices, which are somewhat higher than for the past three years (the average being 44 cents per pound for the crop of Italians of 1900), yield a fair remuneration to the producer. As the marketable output has increased and the price declined, producer and dealer alike have turned their attention to the problems of improvement in quality and extension of markets. Among the first phases of the subject to attract their attention have been the various problems relating to the proper curing of the crop. While endeavoring to solve these, the attention of the grower has been fixed upon the fact that the chief difficulty in the way of improvement lies not so much with the methods of curing as with certain rather undesirable characteristics of the leading variety itself. The climatic conditions of the Pacific Northwest are such that usually the early autumn rains begin, in one section or another, before the prune crop is more than half harvested, resulting not infrequently in the loss of much fruit by bursting, as well as retarding the work of harvesting and increasing the cost of evaporating. The Italian is also a shy bearer, taking one year with another, a feature that is probably due, in large measure, to the self-sterility of its pollen, though occasionally it would seem to be due to the prevalence of cold, wet weather at the time of blossoming. In the meantime those who have been looking for increased market facilities have ascertained that in some sections exception is taken to the cured fruit of this variety of prune on several points, viz, toughness of skin, tartness of flavor, large size of pit, etc. With these several objections in mind, together with the fact that the Italian has been found subject to a malady which manifests itself in a distortion of the foliage, locally called "curl," which threatens to be a more or less serious handicap in the cultivation of this variety, the more progressive growers have been gradually coming to the conclusion that a variety other than the Italian must be found for this section if the best results with this crop are to be obtained.

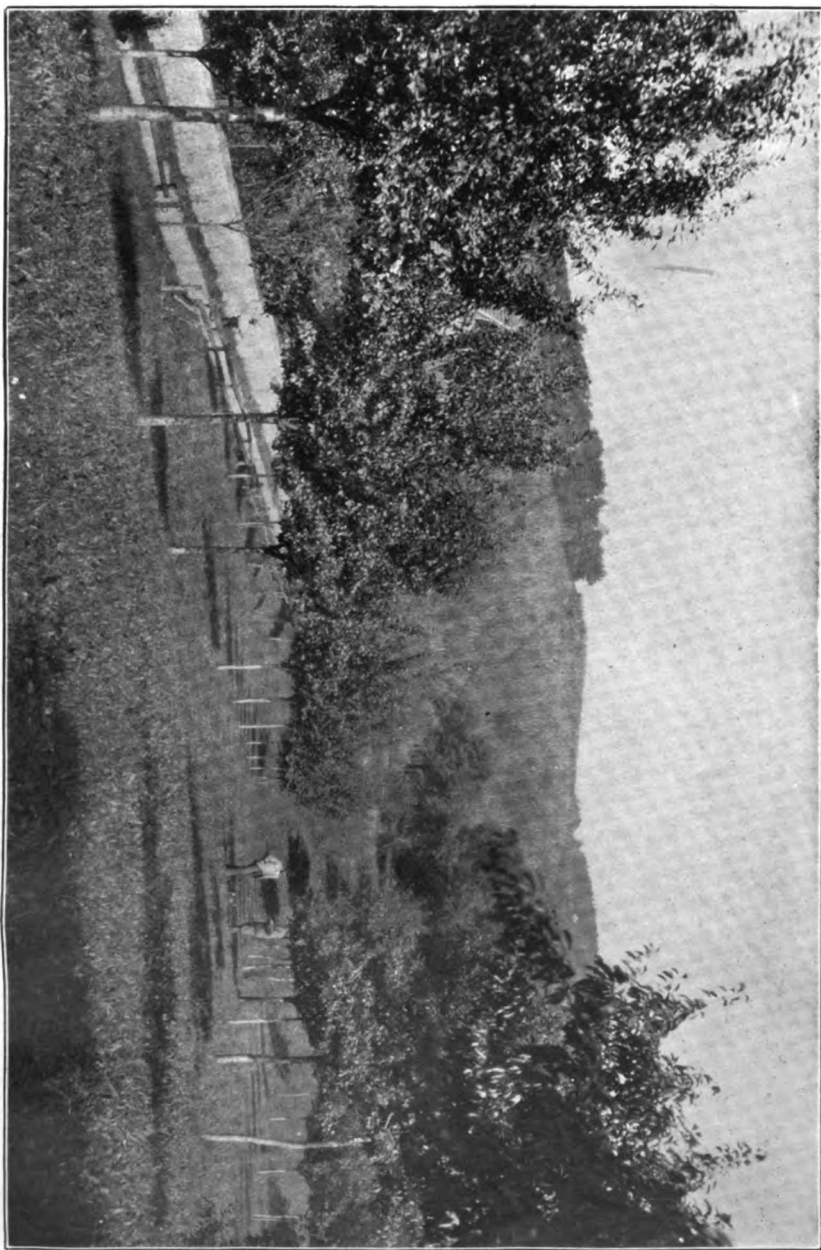
The Italian has been characterized as the "lazy man's tree" because it rarely, if ever, sets so much fruit that the operation of thinning seems desirable. While this quality formerly commended the variety, growers are now generally expressing a desire for a more prolific tree which at the same time will yield a fruit of the same type and possess the desirable qualities of the Italian.

With a view to ascertaining whether there are any European varieties that possess the desired qualities, or part of them, and are therefore worth introducing into the Pacific Northwest, a study of the prune industry of France, Germany, and Austria was made during the summer of 1900, and the results of the observations are embodied in the following pages.

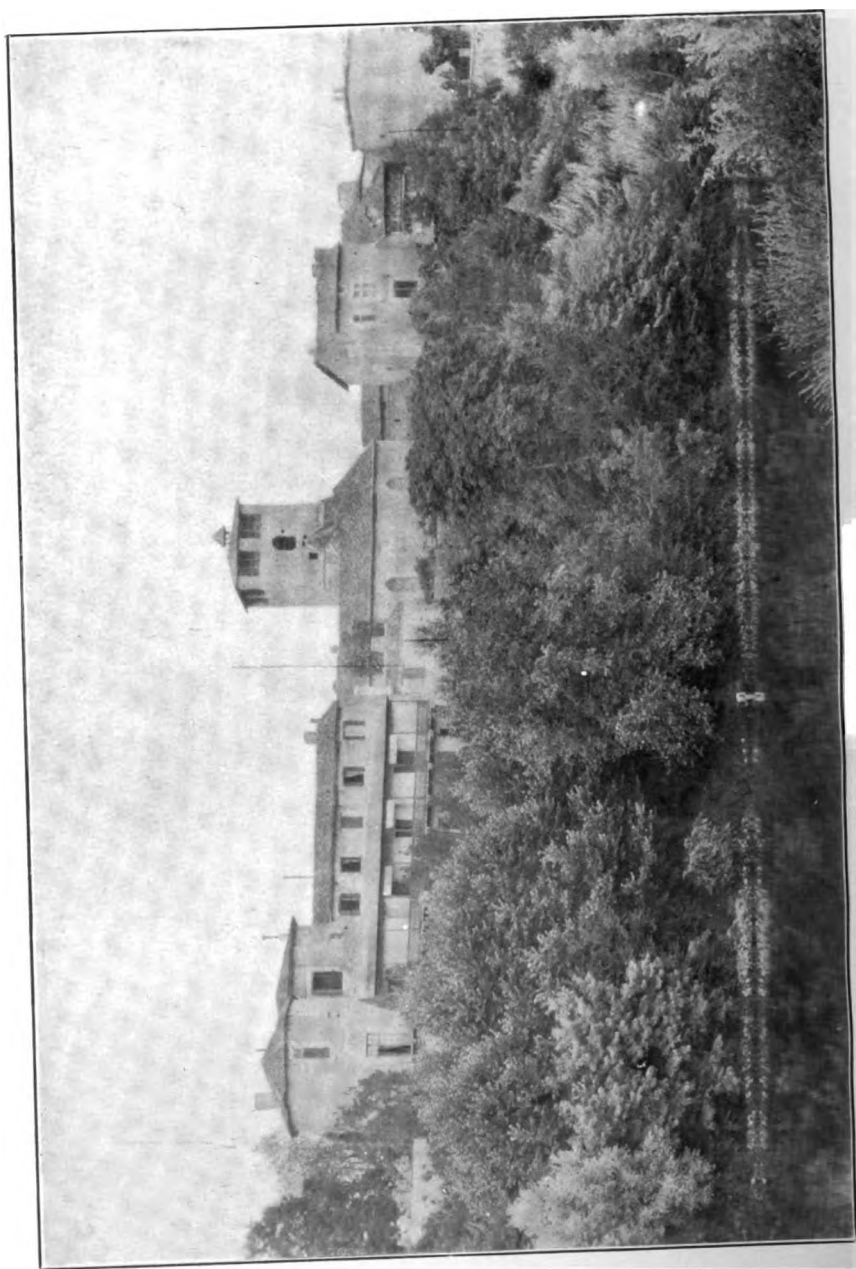


THE ABBEY CLAIRAC.

The spot where the Benedictines planted the first prune tree in France.

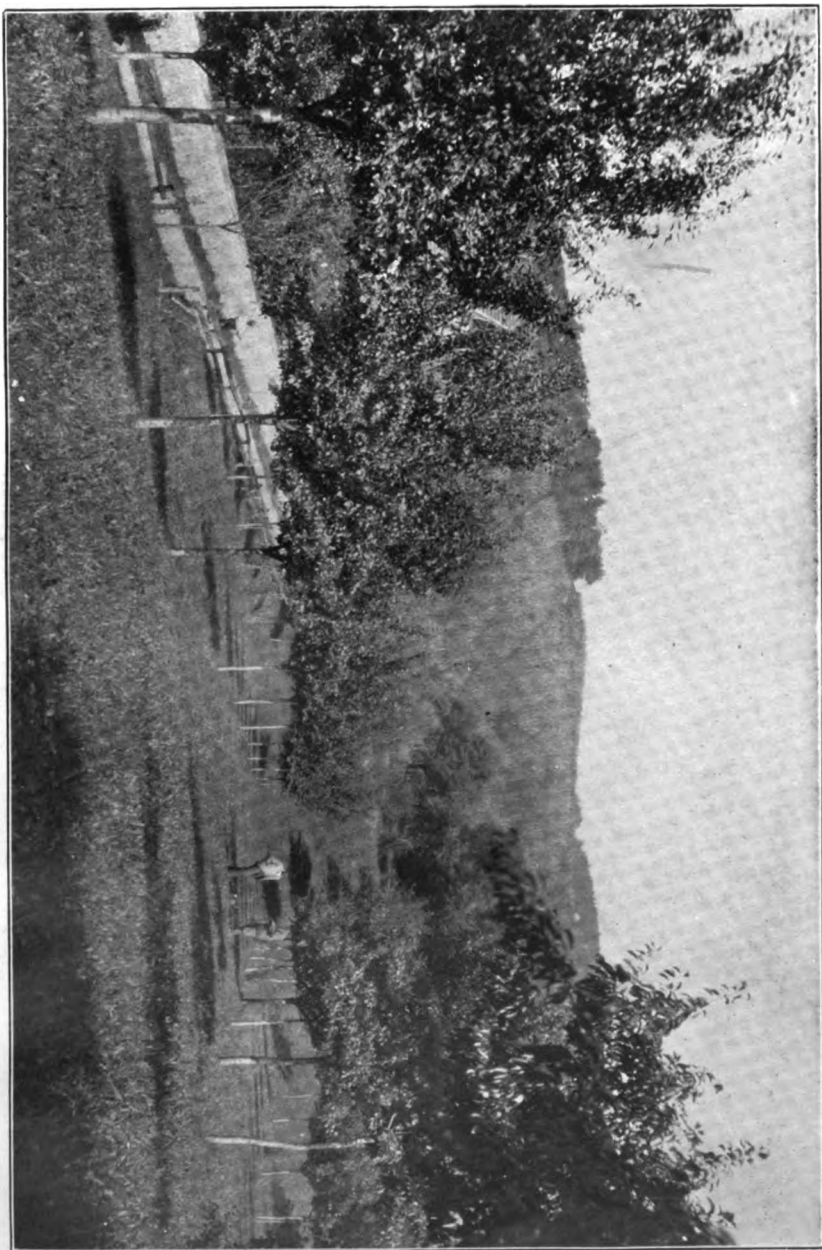


AN ORCHARD OF ITALIAN PRUNE, NINE YEARS OLD, FREIBURG, BADEN, GERMANY.

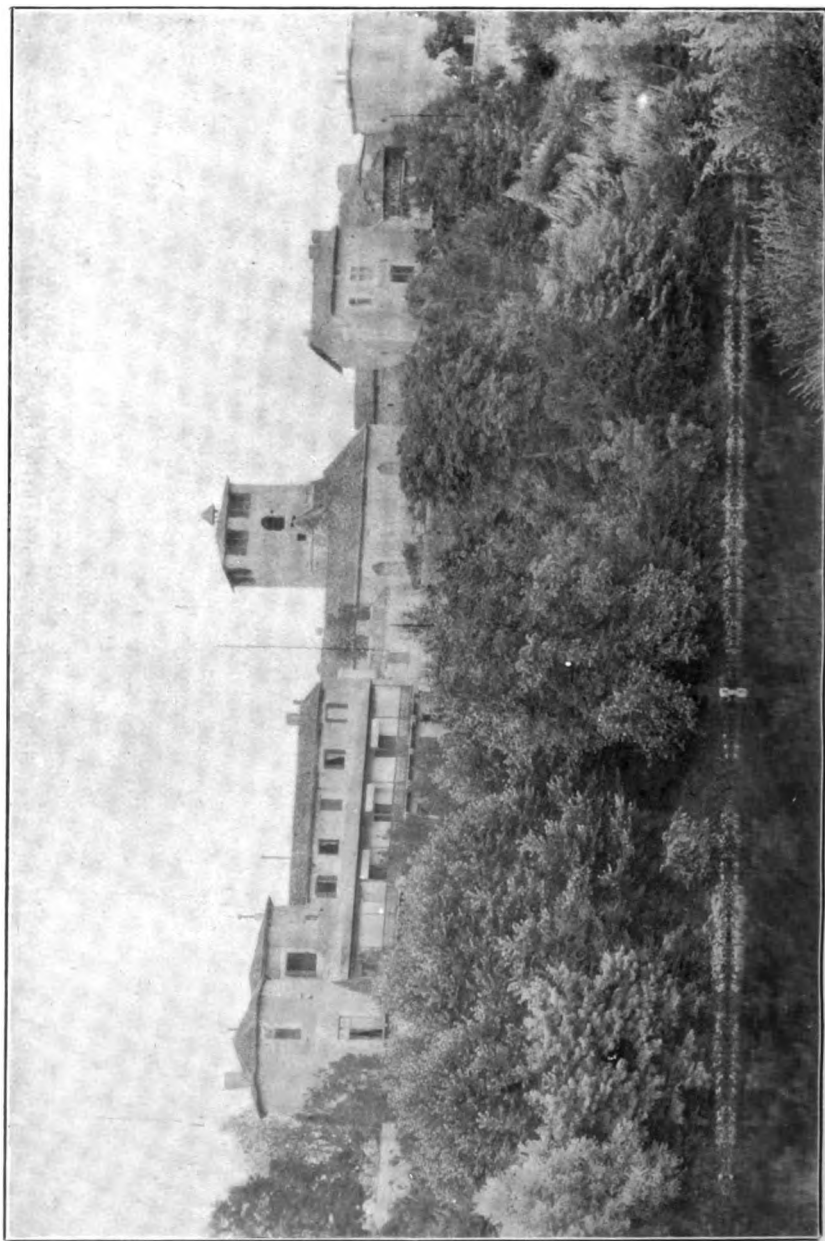


THE ABBEY CLAIRAC.

The spot where the Benedictines planted the first prune tree in France.



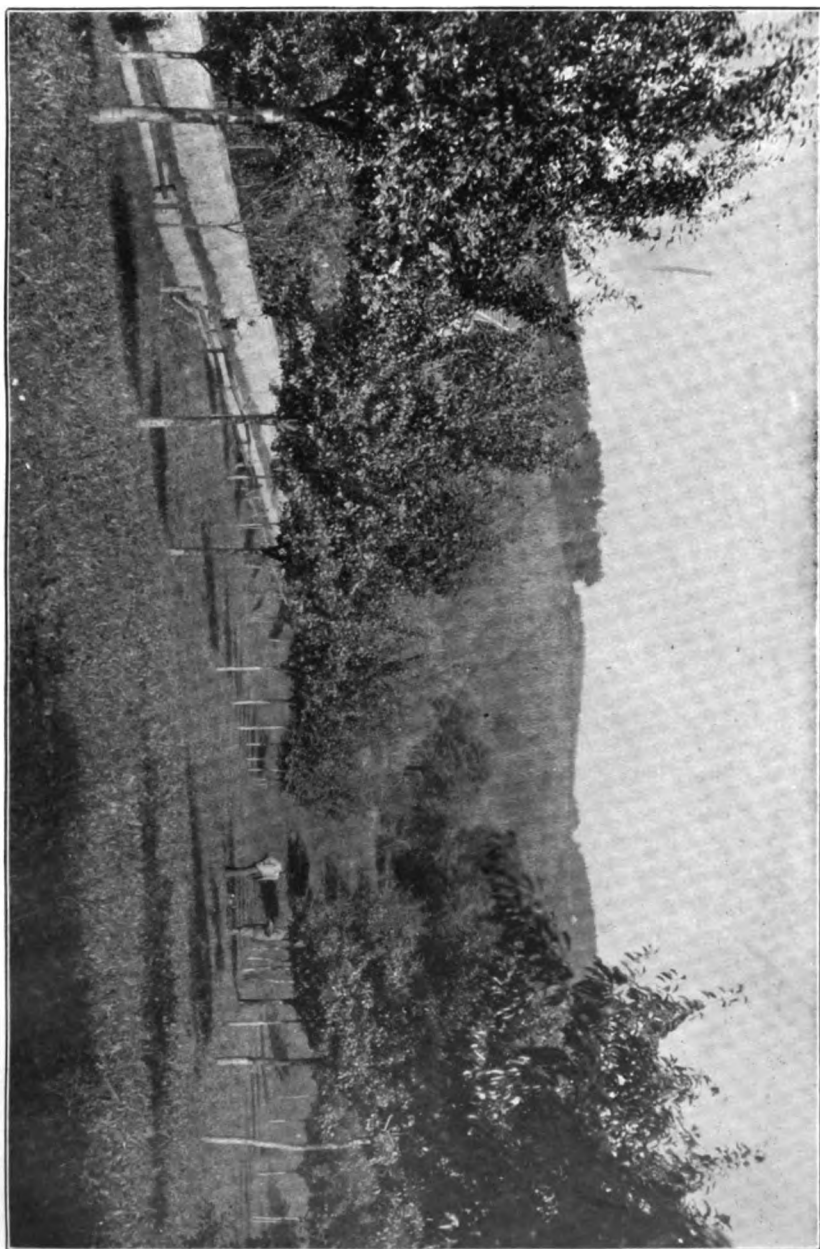
AN ORCHARD OF ITALIAN PRUNE, NINE YEARS OLD, FREIBURG, BADEN, GERMANY.

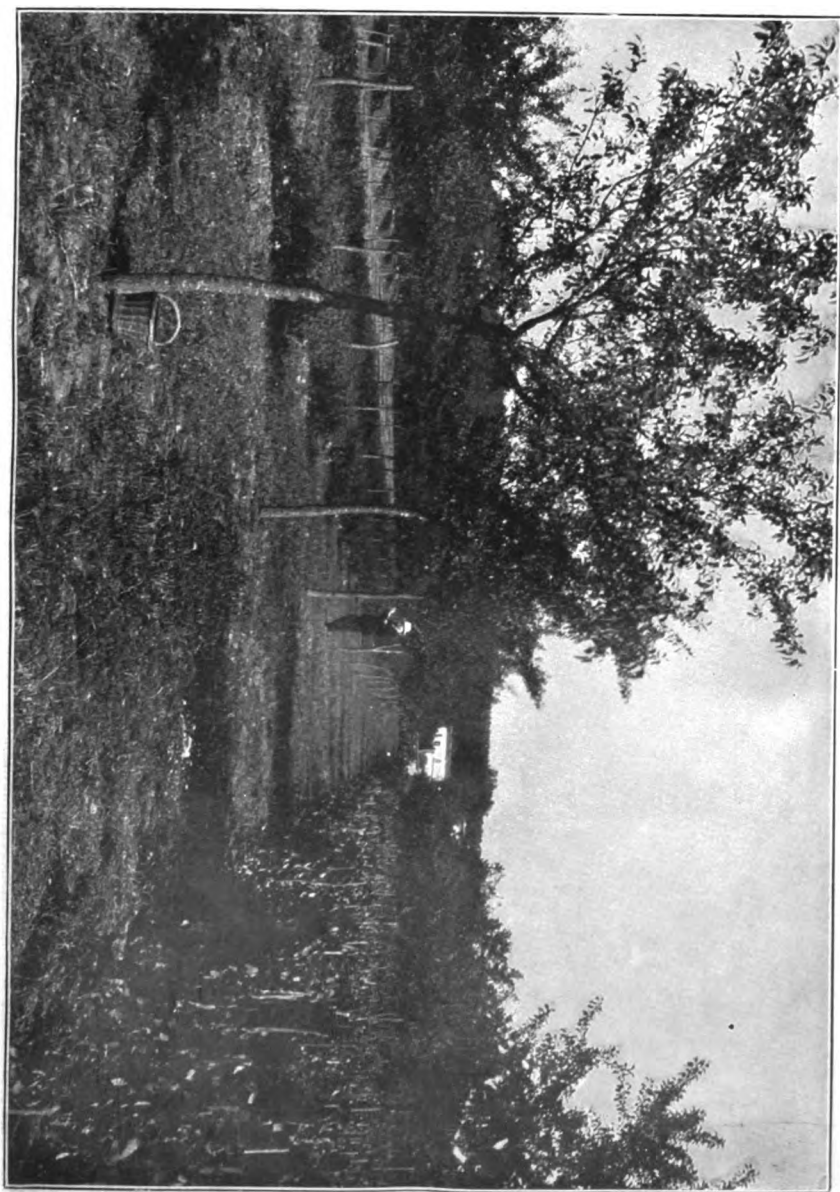


THE ABBEY CLAIRAC.

The spot where the Benedictines planted the first prune tree in France.

AN ORCHARD OF ITALIAN PRUNE, NINE YEARS OLD, FREIBURG, BADEN, GERMANY.





A NINE-YEAR-OLD ORCHARD OF MIRABELLES.
The property of C. Wurschorn, Saint Max, Nancy, France.

THE EUROPEAN PRUNE INDUSTRY.

The prune industry of France is about a thousand years old,¹ and with a few exceptions due to the recent introduction of modern commercial evaporating and packing plants, it is carried on in much the same way to-day, so far as the producer is concerned, as it was four hundred or more years ago. While the industry is less than a half century old in America, and great changes have been made in the methods of producing the cured product, French methods have remained practically unchanged for centuries.

To the person familiar with the Pacific coast orchard areas, France offers a very disappointing field for orchard study. Her orchards would be called, more properly, fruit gardens. As such, of course they are extremely interesting and fraught with lessons to the American horticulturist. While it is true that one finds an occasional small area planted to trees in the way that is common in western America, yet on the whole the orchards of France are composed of a mixture of plantations of fruit trees and shrubs, ornamentals and other plants.

IMPORTANT PRODUCING DISTRICTS.

The chief part of the prunes of France are produced in the northern and eastern parts of the department of Lot et Garonne, a section of country approximately 2,000 square miles in extent, situated in the southwestern part of the country, about 45 miles from Bordeaux and nearly 60 miles from the Atlantic coast; in the northern and western parts of the department of Tarn et Garonne, which is somewhat smaller than the preceding department and lying just to the southeast of it; in the department of Gironde, which is the region surrounding Bordeaux; in the department of Deux-Sevres, a small section lying about 100 miles to the north of Bordeaux and 30 miles from the

¹The introduction of the prune into France is ascribed to the Benedictines, who brought it from Turkey or Persia on their return from participation in the Crusades.

The first trees were planted, so tradition informs us, at the Abbey of Clairac, located on the right bank of the picturesque little river Lot. This abbey, which was founded and given to the Benedictines by Pepin le Bref, King of France, about 752 A. D., is still standing, and is remarkably well preserved. It occupies a commanding position overlooking the valley of the Lot, and, though in the heart of the present village of Clairac, is a conspicuous landmark for many miles up and down the valley.

The location of the Abbey Clairac and the introduction by the Benedictines of the prune to this particular spot seem particularly fortunate, as the conditions were there most favorable for the introduction of this fruit into France. No other people at that time were so much interested in the cultivation of fruits and flowers as the monks, and in no other section of the country would this tree have reached the high development that it has reached here.

This is especially shown by the fact that there are more old prune orchards in the valley of the Lot than in any other section of corresponding area, and there are also more young trees being set out in this section at present than in any other prune-growing district of France (Pl. I).

Atlantic coast; and in the central part of the department of Meurthe et Moselle, an irregular strip of country lying in the northeastern part of France adjacent to the German border and along the Moselle River. The prunes from this latter section are of the "quetsche" type as distinguished from the Agen or *D'Ente*, which is the common type in the former regions. Several other departments also produce unimportant quantities of this fruit. The department of Lot et Garonne produces nearly one-half of the total output of France, which for the year 1900 was approximately 100,000,000 pounds, selling for an average of 4 cents per pound, all sizes. The same year the output of Agen prunes from California was about 130,000,000 pounds, selling for 3 cents per pound on the same basis as in France, while the output for the Pacific Northwest was probably not far from 7,000,000 pounds of Italians, selling for 4½ cents per pound, all sizes, and of Agen, about 5,000,000 pounds, selling for 3 cents per pound,¹ all sizes.

The chief prune-growing sections of Germany are the provinces of Baden, Elsass,² Lothringen,² and the Kingdom of Saxony. This latter region extends into Bohemia along the Elbe River and its tributaries from a point near Tetschen to Leitmeritz, a distance of 30 miles, more or less, and extending over a belt of country probably not less than 15 miles wide on the average, with occasional stretches extending farther. The Bohemian section of this district is of much more commercial importance than the Saxon section.

SOILS.

The soils of the prune-growing sections of France, Germany, and Austria are widely different in their physical and chemical characters. In France the soil is quite universally light, porous, rich in lime, and deficient in humus. The soil types known as sandy or argillo-calcareous (clay and lime) are considered the best for the prune, though pomologists agree that the plum in general is not very particular about the soil in which it grows, so long as it is neither too light and limy nor too wet. Certainly these two conditions in no wise prevail in the European prune orchards. Unfortunately, so much can not be said of all the orchards of the Pacific Northwest. But while the soils of France are generally of a limy and sandy character, those of the sections of Germany and Austria in which the prune is cultivated are largely clayey and darker, because having a greater humus content. These latter soils are more retentive of moisture, and generally the orchards are restricted to hillsides or gently undulating land, whereas in France there is little difference between the acreage on hillsides and in the valleys. The soil of the districts in which the prune is profitably cultivated in southern Germany and northwestern Austria

¹ Oregon Agen prunes were unusually small in 1900.

² Alsace and Lorraine.

resembles very much the average basaltic loams of western Oregon and Washington, while the soils of France generally resemble the soils of the eastern parts of these two States and portions of southern Oregon, though they generally carry a larger lime content than the Pacific coast soils.

ORCHARD METHODS.

In Bohemia are to be seen thousands of acres of prune orchards planted on the same general plan as our American orchards, with these differences: There are no large individual or corporate plantings, and prune trees are freely planted along the highways, lanes, boundary lines, and about the buildings as well as in orchards. An occasional single orchard block may contain 20 acres, and while this may appear quite insignificant to the large orchardist of the Pacific coast, it is very different from the French type of prune orchard, which is generally a very irregular and mixed plantation of fruit-bearing trees, shrubs, vines, and other plants.

With the exception of a quite limited region about Sainte Livrade and Villeneuve-sur-Lot, and an irregular and broken section in eastern France between the Meuse and Moselle rivers, the prune orchards of France are not planted in blocks or masses. The trees are set in rows, usually, though frequently there appears to be no attempt at regularity, and when in rows the rows are from 40 to 60 feet apart. Frequently three or four rows are planted side by side, the trees being approximately 16 to 20 feet apart each way. These zones or belts of rows are separated from one another by several rods of open field, and occasionally one such belt of rows, extending from one end of a field to the other or even from one end of the farm to the other, will be the full extent of the orchard plantation upon a given property. In the rows not only are prunes planted but there may be cherries, apples, pears, peaches, quinces, bush fruits, grapes, nuts, osier willows, and an occasional ornamental tree. Between the rows of trees are grown the various cereal, forage, and root crops, or in many instances the tract of open land is a meadow. Often an owner or renter will have a few trees in a certain locality and others widely separated from them. Not infrequently these different orchard plats are 2 or 3 miles apart.

The trees are never cultivated for themselves. Such tillage as the soil receives is given for the benefit of the field crops. It must not be inferred from this, however, that fruit trees are never cultivated in France. In the region surrounding Paris, where immense quantities of fruit such as cherries, plums, pears, apples, and small fruits are grown, excellent tillage is given the soil, but in this region, where land is very valuable, trees are grown close together—6 to 8 feet apart usually—and the ground is literally covered with other crops. Or the tree crops may be scattered or in irregular groups, and no particular attention given them save to gather the fruit.

The same course is followed in the German and Austrian orchards and tree plantations, consequently the trees of these various sections are generally much smaller than trees of a corresponding age on the Pacific coast. Pl. II shows a German orchard of Italian Prune trees that are nine years old. Pl. III shows a French orchard of Mirabelles that are nine years old. Fig. 3 of Pl. IV shows a row of Agen trees in a French orchard twenty years old. Fig. 1 of Pl. IV shows three rows of German Prune trees in France eighteen years old.

STOCKS.

In the Pacific Northwest the peach is the common stock for the plum, though during the past few years the Myrobalan plum has been used to some extent. In France, Germany, and Austria all plums are grown on plum stocks, and occasionally this stock is used quite extensively for the peach. The common stock for the Agen is the St. Julien; for the "quetsches," St. Julien and White Damson; for the Mirabelle, St. Julien and Myrobalan. This latter is not regarded by the growers as a desirable stock, but nurserymen prefer to use it, and if the stock is not specified this is the one usually sent out. Growers assert that trees on Myrobalan stock are much shorter lived than those on St. Julien stock. How much real weight can be attached to this statement is not known, as well-authenticated experiments have not been conducted along this line. French horticulturists give as their reasons for using the plum stock generally for the peach, that it is a deeper feeder, lives longer, is hardier, more vigorous, and less susceptible to adverse soil conditions, and for planting near houses it is to be preferred to the peach, because it will send its roots deep into the cold earth below the basement walls and thus develop a crop under conditions in which the peach would barely live, except it should feed entirely from the adjacent border, which is desired for other crops. When it is known that a very large proportion of the peach trees of France is grown as espaliers on high walls and sides of buildings, the force of the position taken by the French growers and propagators is apparent.

PRUNING AND TRAINING.

In Europe the universal practice is to train orchard trees with high heads, the object being to let the sun and air have free access to the ground in order that the cover crop may have ample opportunity for development. Usually the trees are headed at a height of from 4 to 5 feet. Little pruning is done, save to thin out and occasionally to cut back the young growth if the trees are grown on land that is irrigated. The heads are usually round to roundish, and generally much smaller than in the case of Pacific Coast trees of corresponding age. The plum tree lives to a good old age in Europe and frequently is of large size.



FIG. 1.—GERMAN PRUNE AT EPIVAL, FRANCE.



FIG. 2.—PRUNE TREES AT CARCASSONNE.



FIG. 3.—AGEN PRUNE AT VILLENEUVE-SUR-LOT, FRANCE.

TYPICAL PRUNE ORCHARDS OF FRANCE.

